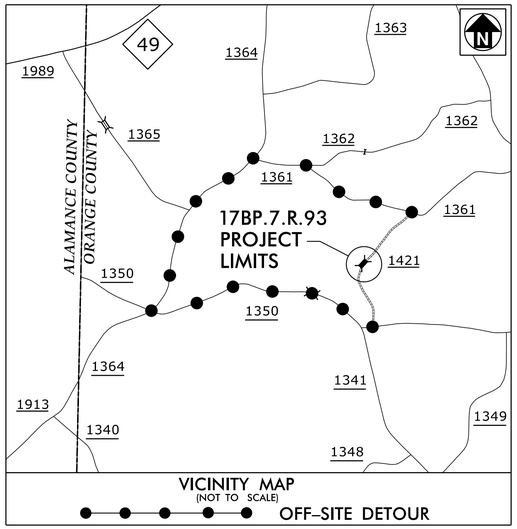
TIP PROJECT: 17BP.7.R.93

CONTRACT:



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

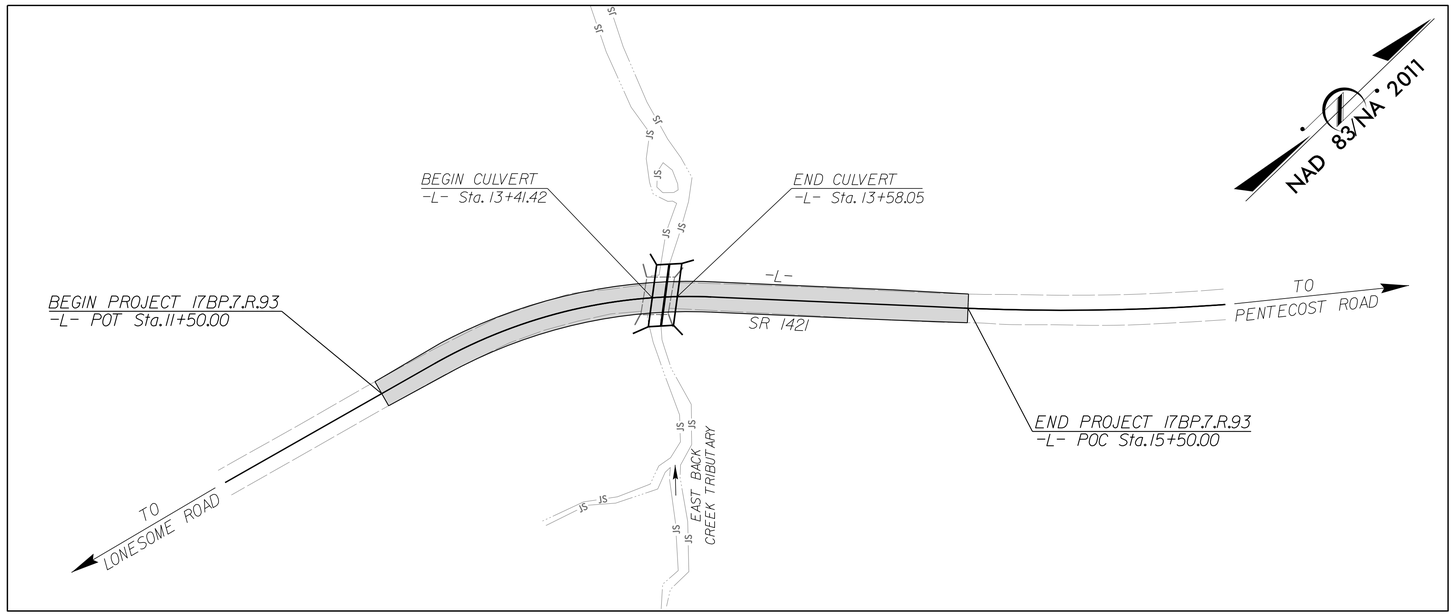
ORANGE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.7.R.93	1	

STATE PROJECT NO.	F.A. PROJ. NO.	DESCRIPTION

LOCATION: BRIDGE NO. 18 OVER EAST BACK CREEK TRIBUTARY ON SR 1421 (LIB ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT



*DESIGN EXCEPTION:
- MIN. HORIZONTAL CURVE RADIUS
- SAG VERTICAL CURVE K
- HORIZONTAL SSD
- VERTICAL SSD
- SUPERELEVATION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2000 = 50

ADT 2025 = 100

V = 55 MPH

SUB REGIONAL TIER
LOCAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT = 0.073 MILES

LENGTH STRUCTURE TIP PROJECT = 0.003 MILES

TOTAL LENGTH TIP PROJECT = 0.076 MILES

Prepared in the Office of Hatch Mott MacDonald for

DIVISION 7

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

LETTING DATE:

TIM JORDAN, PE
PROJECT ENGINEER

CHRISTOPHER LEWIS, PE
HYDRAULICS ENGINEER

NCDOT CONTACT: TIM POWERS, PE
DIVISION BRIDGE PROGRAM MANAGER

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER TIMOTHY MICAH JORDAN

DocuSigned by: Jame Timothy Jordan 10/10/2016

SIGNATURE: P.E.

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 041420 ENGINEER CHRISTOPHER K LEWIS

DocuSigned by: Christopher Lewis 10/17/2016

SIGNATURE: P.E.

PLANS PREPARED BY:

MOTT MACDONALD
PO Box 700
Fuquay–Varina, NC 27526
(919) 552–2253
(919) 552–2254 (Fax)
www.mottmac.com

LICENSE NO. F–0669

10/10/2016
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GENERAL NOTES:

2012 SPECIFICATIONS
EFFECTIVE: 01-17-12
REVISED: 10-31-14

GRADE LINE:
GRADING AND SURFACING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

GUARDRAIL:

THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE PIEDMONT ELECTRIC AND CENTURY LINK.

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

INDEX OF SHEETS

EFF: 01-17-12
REV: 02-29-2016

2012 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2012 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
862.01	Guardrail Placement
862.02	Guardrail Installation
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 - ORANGE 18	1-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JOHNSON
Signed by: JAMES TIMOTHY JOHNSON
10/24/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

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MOTT MACDONALD
PO Box 700
Fuquay-Varina, NC 27526
www.mottmac.com

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	1–8

Note: Not to Scale

****S.U.E. = Subsurface Utility Engineering***

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite R/W Marker — RW
- Proposed Control of Access Line with Concrete C/A Marker — C/A
- Existing Control of Access — C/A
- Proposed Control of Access — C/A
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Aerial Utility Easement — AUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp — CR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H–Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

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PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	2

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

DocuSigned by: James Timothy Jordan
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10/10/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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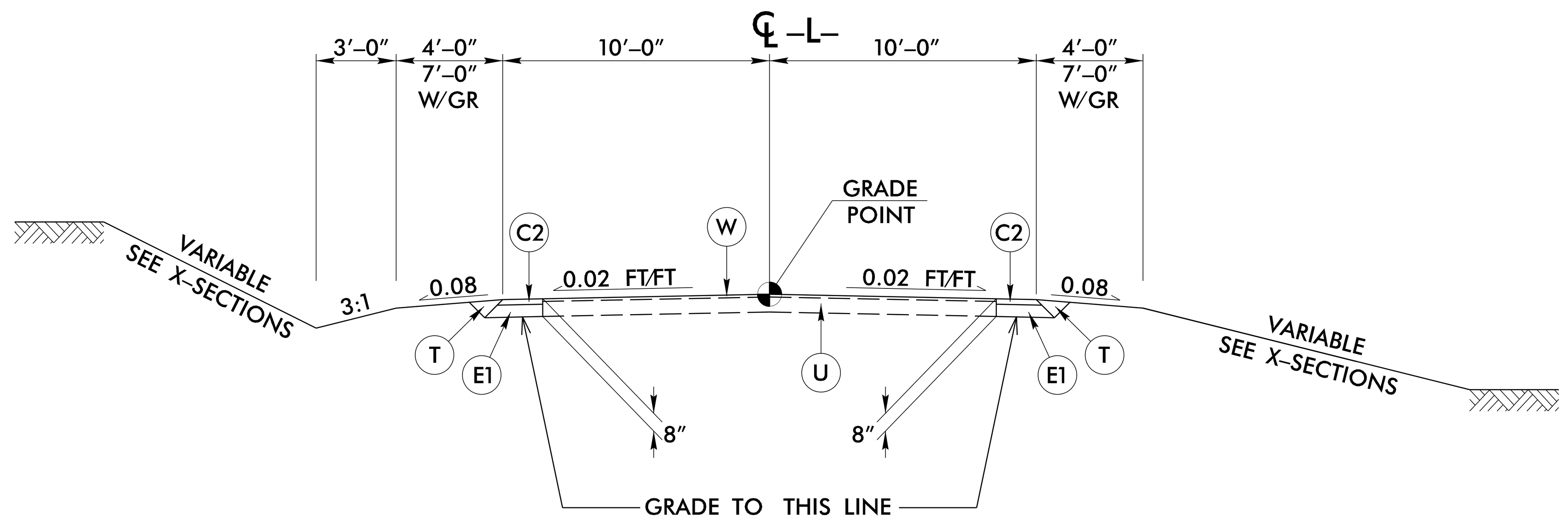
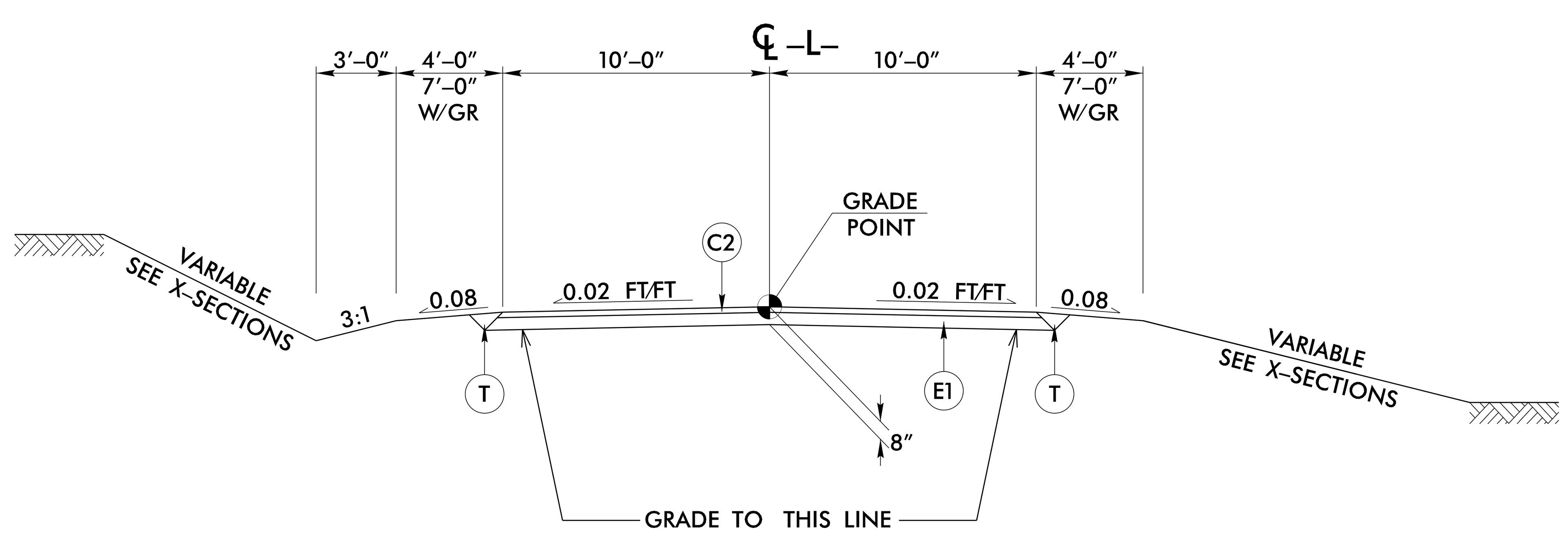


TYPICAL SECTION NO. 1

TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1:
–L– STA 11+50.00 TO 12+00.00

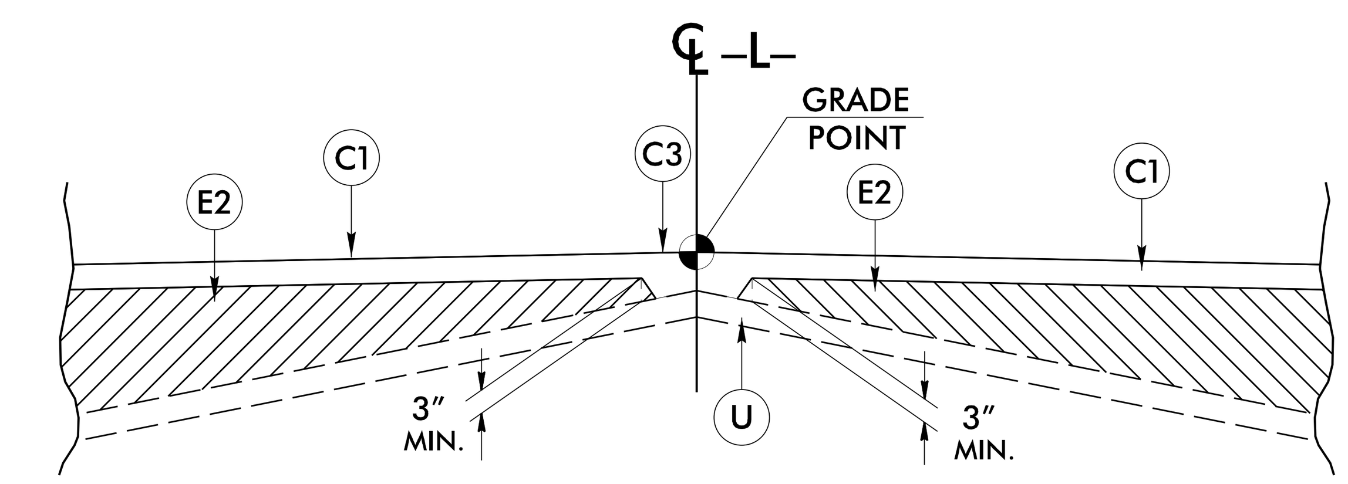
USE TYPICAL SECTION NO. 1:
–L– STA 12+00.00 TO 12+90.00
–L– STA 13+65.00 TO 15+00.00

TRANSITION FROM TYPICAL SECTION NO. 1 TO EXISTING:
–L– STA 15+00.00 TO 15+50.00



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2:
–L– STA 12+90.00 TO 13+65.00



Detail Showing Method of Wedging

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1" IN DEPTH OR GREATER THAN 1½" IN DEPTH.
E1	PROP. APPROX. 5½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	WEDGING (SEE DETAIL SHOWING METHOD OF WEDGING).

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

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PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	3

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL.
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.
G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOULDER WIDTH	FLARE LENGTH		W		ANCHORS								IMPACT ATTENUATOR TYPE 350			REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	AT-1	GRAU 350 TL-2	TYPE III	25' CLEAR SPAN					PERMITTED		
																							NO.	G	NG	
-L-	12+78 +/-	14+53 +/-	RT	175.00'			13+37.27 (CULVERT)	13+54.91 (CULVERT)	4'	7'						2		1								
-L-	12+46 +/-	14+21 +/-	LT	175.00'			13+61.27 (CULVERT)	13+45.61 (CULVERT)	4'	7'						2		1								
		SUBTOTAL		350.00'																						
		LESS ANCHOR DEDUCTIONS																								
		GRAU-350 TL-2 4 x 25.00' =		-100.00'																						
		25' CLEAR SPAN 2 x 100.00' =		-200.00'																						
		TOTAL		50.00'												4		2								

SUMMARY OF EARTHWORK
IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- 11+50.00 TO 15+50.00	8		320	312	
SUBTOTAL	8		320	312	
WASTE IN LIEU OF BORROW					
PROJECT TOTAL	8			312	
5% TO REPLACE BORROW				16	
GRAND TOTAL	8			328	
SAY	10			350	

NOTE: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Fine Grading, Clearing and Grubbing and Removal of Existing Asphalt Pavement will be paid for at the contract Lump Sum price for "Grading".

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	4

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102, JAMES TIMOTHY JORDAN — DocuSigned by: 3A6529B19D2E444 — 10/10/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 041420, CHRISTOPHER R. LEWIS — DocuSigned by: E938DEABF34A4FE — 10/17/2016

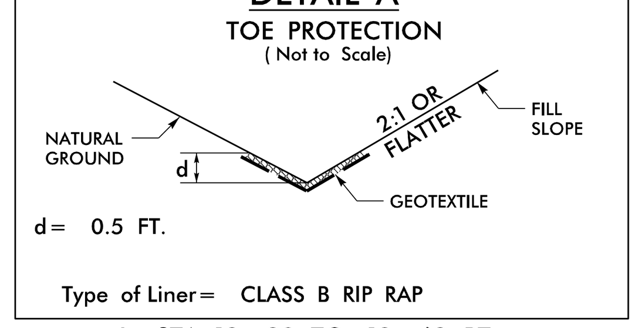
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of: MOTT MACDONALD, PO Box 700, Fuquay-Varina, NC 27526, www.mottmac.com

VERTICAL SCALE 5′ 0 5′ 10′ — HORIZONTAL SCALE 25′ 0 25′ 50′

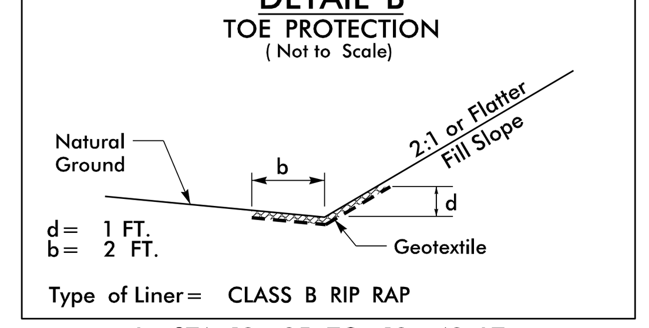
*DESIGN EXCEPTION:
- MIN. HORIZONTAL CURVE RADIUS
- SAG VERTICAL CURVE K
- HORIZONTAL SSD
- VERTICAL SSD
- SUPERELEVATION

DETAIL A



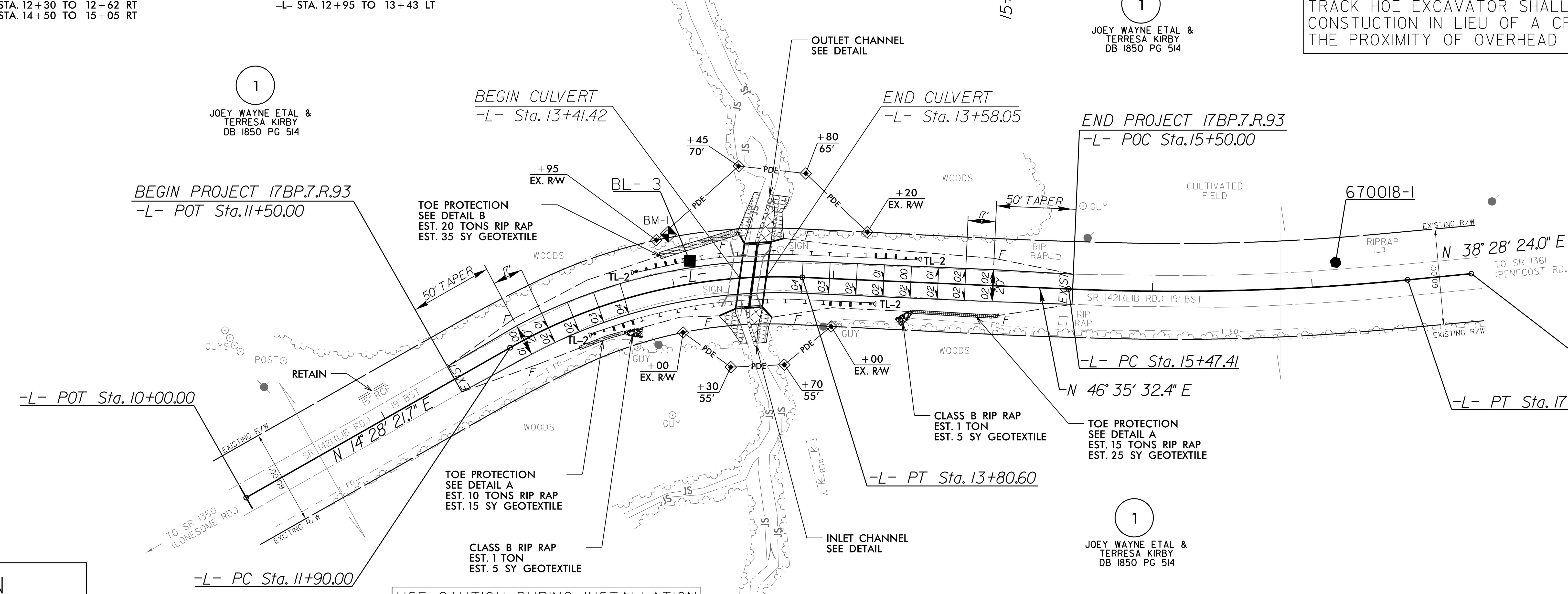
–L– STA. 12+30 TO 12+62 RT
–L– STA. 14+50 TO 15+05 RT

DETAIL B



–L– STA. 12+95 TO 13+43 LT

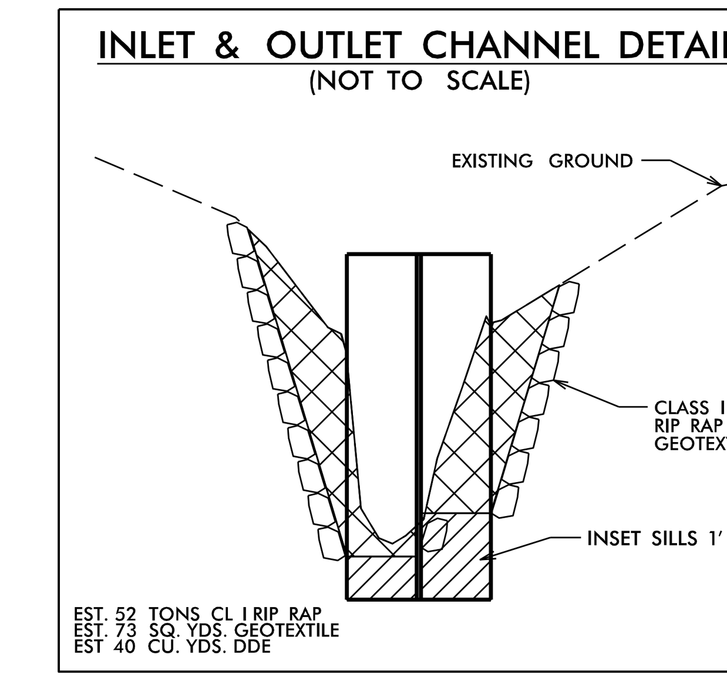
TRACK HOE EXCAVATOR SHALL BE USED FOR CONSTUCTION IN LIEU OF A CRANE DUE TO THE PROXIMITY OF OVERHEAD POWER LINES



USE CAUTION DURING INSTALLATION OF TOE PROTECTION & DISSIPATOR PAD - AVOID UNDERGROUND FIBER

1
JOEY WAYNE ETAL & TERRESA KIRBY
DB 1850 PG 514

INLET & OUTLET CHANNEL DETAIL



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "670018-1"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 882511.209(ft) EASTING: 1933716.128(ft)
ELEVATION: 633.67(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999767200
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "670018-1" TO -L- STATION 10+00.00 IS
N 31° 53′ 23.3″ E DISTANCE: 697.59 ft
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

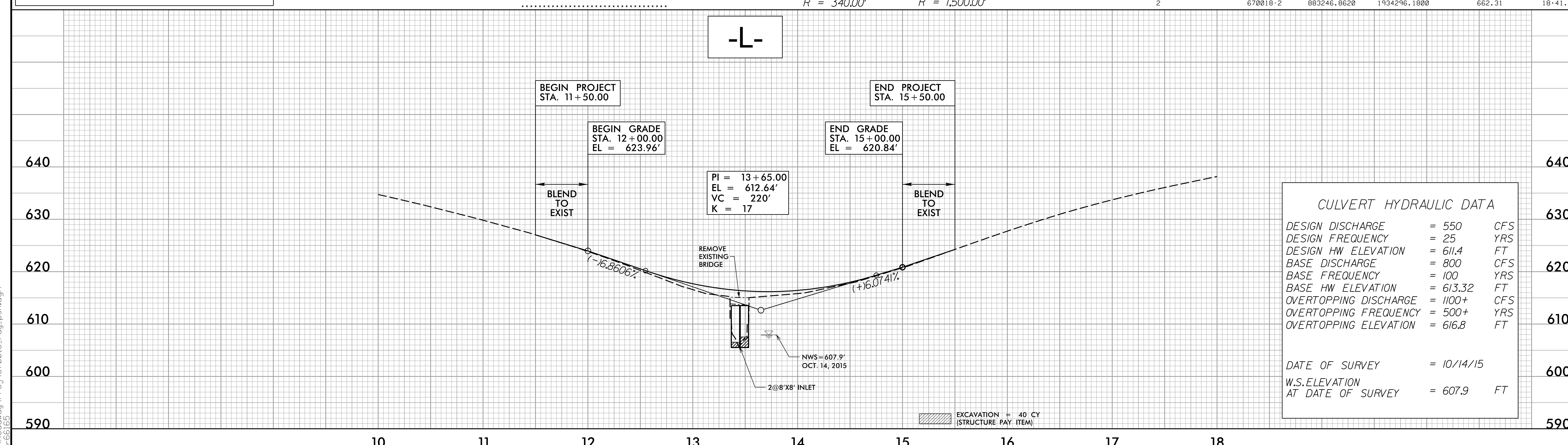
BM #1 ELEVATION = 620.00
N 882224 E 1933413
BL STATION 5+00.00
N 84°32′46.88″ W DIST 21.30′
BENCH TIE SPIKE IN 26″ OAK

-L-

PI Sta 12+87.88	PI Sta 16+53.86
△ = 32° 07′ 10.8″ (RT)	△ = 8° 07′ 08.5″ (LT)
D = 16° 51′ 06.1″	D = 3° 49′ 11.0″
L = 190.60′	L = 212.56′
T = 97.88′	T = 106.46′
R = 340.00′	R = 1,500.00′

BL

POINT	DESC.	NORTH	EAST	ELEVATION	BL STATION
3	BL-3	882221.4951	1933434.1446	615.22	5+00.00
1	670018-1	882511.2090	1933716.1280	633.67	9+04.29
2	670018-2	883246.8620	1934296.1800	662.31	18+41.12



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 550	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 611.4	FT
BASE DISCHARGE	= 800	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 613.32	FT
OVERTOPPING DISCHARGE	= 1100+	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 616.8	FT
DATE OF SURVEY	= 10/14/15	
W.S.ELEVATION AT DATE OF SURVEY	= 607.9	FT

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THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" – HIGHWAY DESIGN BRANCH– N.C. DEPARTMENT OF TRANSPORTATION – RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD.	TITLE
1101.03	TEMPORARY ROAD CLOSURES
1110.01	STATIONARY WORK ZONE SIGNS
1145.01	BARRICADES
1205.01	PAVEMENT MARKINGS – LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS – TWO–LANE AND MULTI–LANE ROADWAYS
1205.12	PAVEMENT MARKINGS – BRIDGES
1261.01	GUARDRAIL AND BARRIER DELINEATORS – INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS – TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT EXCEPT WHEN OTHERWISE NOTED IN THE PLAN OR DIRECTED BY THE ENGINEER.

TRAFFIC PATTERN ALTERATIONS

A) NOTIFY THE ENGINEER TWENTY ONE (21) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

B) PROVIDE PERMANENT SIGNING.

C) PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.

PROVIDE SIGNING REQUIRED FOR THE OFF–SITE DETOUR ROUTE AS SHOWN IN THE TRAFFIC CONTROL PLANS.

D) COVER OR REMOVE ALL SIGNS AND DEVICES REQUIRED TO CLOSE THE ROAD WHEN ROAD CLOSURE IS NOT IN OPERATION.

COVER OR REMOVE ALL SIGNS REQUIRED FOR THE OFF–SITE DETOUR WHEN THE DETOUR IS NOT IN OPERATION.

E) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

TRAFFIC CONTROL DEVICES

F) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11–2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY.

PAVEMENT MARKINGS AND MARKERS

G) INSTALL PAVEMENT MARKINGS ON THE FINAL SURFACE.

jor66165
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10/5/2016
9:32:20 AM

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	TMP–1

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JOHNSON

Signed by: JAMES TIMOTHY JOHNSON
10/5/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F–0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:
MOTT MACDONALD
PO Box 700
Fuquay–Varina, NC 27526
www.mottmac.com

PHASING

STEP 1: USING ROADWAY STANDARD DRAWING NUMBER 1101.03, SHEET 1 OF 9, AND SHEET TMP–2, PERFORM THE FOLLOWING:
– INSTALL ALL ROAD CLOSURE AND DETOUR SIGNING INCLUDING BARRICADES
– CLOSE SR 1421 (LIB ROAD)
– PLACE TRAFFIC ONTO OFF– SITE DETOUR

STEP 2: REMOVE EXISTING BRIDGE #18 AND CONSTRUCT THE PROPOSED CULVERT AND APPROACHES AS SHOWN IN THE CONSTRUCTION PLANS.

STEP 3: INSTALL FINAL PAVEMENT MARKINGS.

STEP 4: REMOVE ALL TRAFFIC CONTROL SIGNING AND DEVICES AND RE–OPEN SR 1421 (LIB ROAD) TO THE FINAL TRAFFIC PATTERN.

PAVEMENT MARKING

PAINT WHITE EDGELINE (4")	1,600 LF
PAINT YELLOW DOUBLE CENTER (4")	1,600 LF

NOTE: QUANTITY INCLUDES 2 APPLICATIONS OF EACH

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	TMP–2

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES WILLIAM JOHNSON, TIMOTHY

10/5/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F–0669

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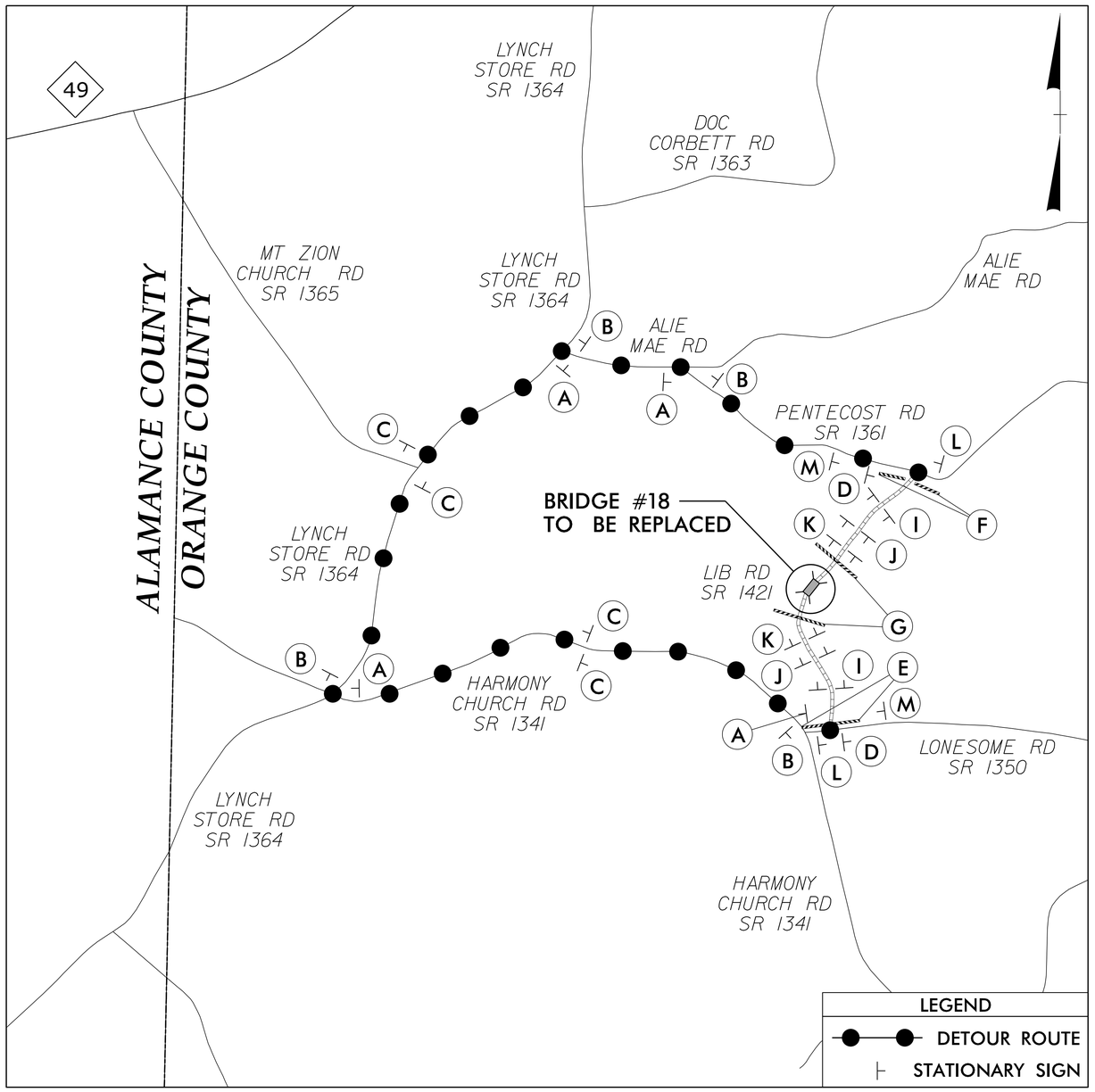

✱ SEE SHEET TMP–3 FOR SPECIAL SIGN DESIGNS

✱ LIB ROAD
DETOUR
M4–8 24″ X 12″
M6–1 R 21″ X 15″
(A)

✱ LIB ROAD
DETOUR
M4–8 24″ X 12″
M6–1 L 21″ X 15″
(B)

✱ LIB ROAD
DETOUR
M4–8 24″ X 12″
M6–3 21″ X 15″
(C)

END DETOUR
M4–8 A 24″ X 18″
(D)

R11-4 60″ x 30″
ROAD CLOSED TO THRU TRAFFIC
DETOUR
M4-10L 48″ x 18″
TYPE III BARRICADE
(E)

R11-4 60″ x 30″
ROAD CLOSED TO THRU TRAFFIC
DETOUR
M4-10R 48″ x 18″
TYPE III BARRICADE
(F)

R11-2 48″ x 30″
ROAD CLOSED
TYPE III BARRICADE(S)
(G)

DETOUR AHEAD
W20–2 48″ X 48″
NOT USED (H)

ROAD CLOSED AHEAD
W20–3 48″ X 48″
(I)

ROAD CLOSED 1000 FT
W20–3 48″ X 48″
(J)

ROAD CLOSED 500 FT
W20–3 48″ X 48″
(K)

W20–3 48″ X 48″
ROAD CLOSED AHEAD
NEXT LEFT
SP–4L 42″ X 12″
(L)

W20–3 48″ X 48″
ROAD CLOSED AHEAD
NEXT RIGHT
SP–4R 42″ X 12″
(M)

or-66165
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10/5/2016 9:32:20 AM

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	TMP–3

TRAFFIC ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023988 ENGINEER MARK A. FREEMAN

Mark A. Freeman
10/17/2016

MOTT MACDONALD I & E, LLC
LICENSE NO. F–0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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PO Box 700
Fuquay–Varina, NC 27526
www.mottmac.com

SIGN NUMBER: SD-1
TYPE: D
QUANTITY: SEE PLANS

SIGN WIDTH: 2′-6″
HEIGHT: 2′-6″
TOTAL AREA: 6.3 Sq.Ft.

BORDER TYPE: INSET
RECESS: 0.38″
WIDTH: 0.5″
RADII: 1.5″

NO. Z BARS:
LENGTH:

BACKG COLOR: Fluorescent Orange
COPY COLOR: Black

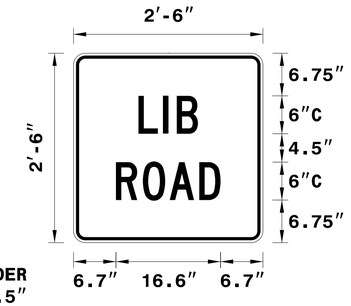
SYMBOL	X	Y	WID	HT

MAT′L: 0.063″ (2.0 mm) ALUMINUM

DESIGN BY: PJ
PROJECT ID: 17BP.7.R.93
CHECKED BY: NKP
DIV: 7
DATE: Oct 20, 2015

USE NOTES: 1,2

1. Legend and border shall be direct applied black non-reflective sheeting.
2. Background shall be NC GRADE B fluoresent orange retroreflective sheeting.



BORDER
R=1.5″
TH=0.5″
IN=0.38″

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter locations are panel edge to lower left corner

																											Series/Size Text Length
	L	I	B																								C 2000
	10.3	14.2	16.4																								9.4
	R	O	A	D																							C 2000
	6.7	11	15.2	19.9																							16.6

FILENAME: 670018_rdy_tmp3

NORTH CAROLINA D.O.T. SIGN DETAIL

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.7.R.93	EC-1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

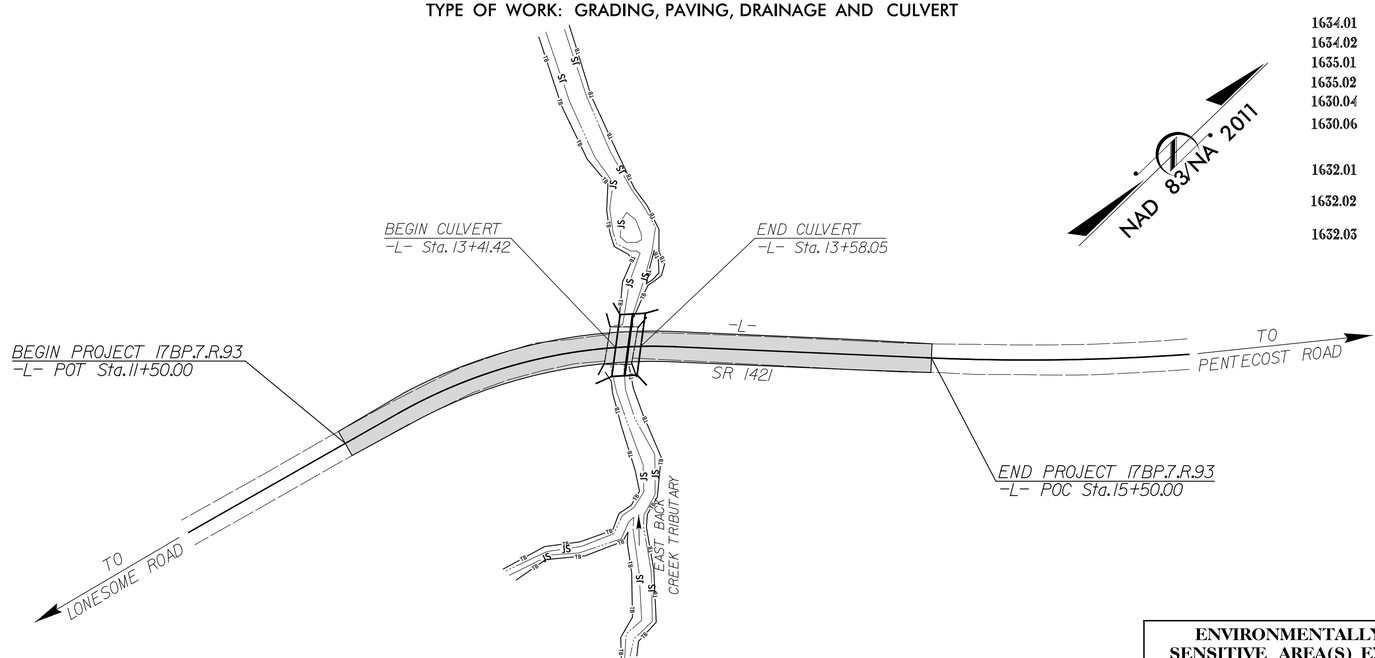
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

ORANGE COUNTY

LOCATION: BRIDGE NO. 18 OVER EAST BACK CREEK TRIBUTARY ON SR 1421 (LIB ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT



*DESIGN EXCEPTION:
MIN. HORIZONTAL CURVE RADIUS
SAG VERTICAL CURVE K
HORIZONTAL SSD
VERTICAL SSD
SUPERELEVATION

EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	TSD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	
1633.02	Temporary Rock Silt Check Type-B	
	Wattle / Coir Fiber Wattle	SW CFW
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	
1634.01	Temporary Rock Sediment Dam Type-A	
1634.02	Temporary Rock Sediment Dam Type-B	
1635.01	Rock Pipe Inlet Sediment Trap Type-A	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1630.04	Stilling Basin	
1630.06	Special Stilling Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	SK
	Tiered Skimmer Basin	SK
	Infiltration Basin	SK

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

HIGH QUALITY WATER(S) EXIST ON THIS PROJECT

High Quality Water Zone(s) Exist
From Sta. 11+50 -L-
to Sta. 15+50 -L-
Refer To E. C. Special Provisions for Special Considerations.

GRAPHIC SCALE

50
PLANS
50
PROFILE (HORIZONTAL)
10
PROFILE (VERTICAL)

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE AUGUST 3, 2011 AND ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DIVISION OF WATER RESOURCES.

Prepared In the Office of:
HDR | ICA
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

Designed by:
ALEXANDER D SNIDER, PE *3064*
NAME LEVEL III CERTIFICATION NO.

Reviewed In the Office of:
ROADSIDE ENVIRONMENTAL UNIT
1 South Wilmington St.
Raleigh, NC 27611

2012 STANDARD SPECIFICATIONS

Reviewed by:
JEFF WALSTON, PE, CPESC, CPSWQ

Roadway Standard Drawings

The following roadway english standards as appear in "Roadway Standard Drawings"– Roadway Design Unit – N. C. Department of Transportation – Raleigh, N. C., dated January 2012 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

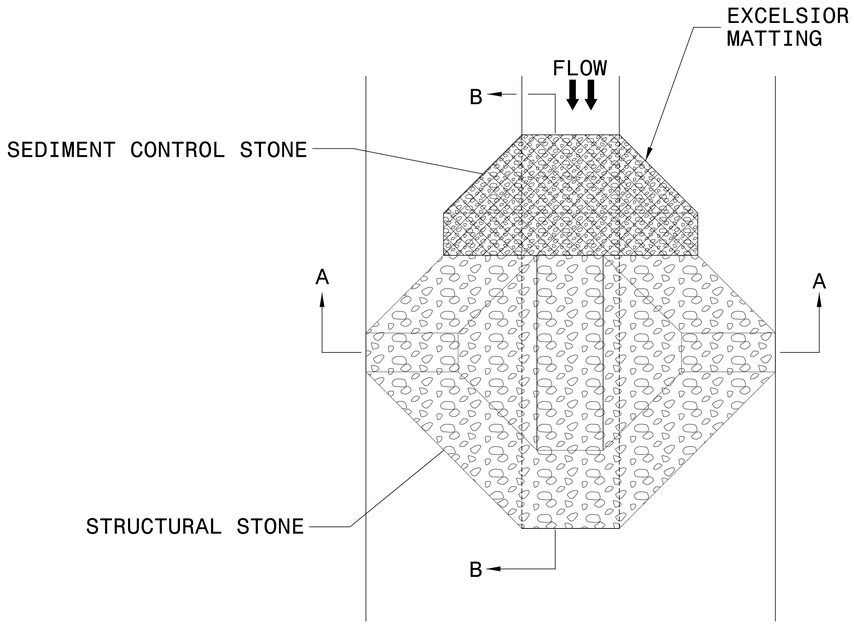
1604.01	Railroad Erosion Control Detail	1632.01	Rock Inlet Sediment Trap Type A
1605.01	Temporary Silt Fence	1632.02	Rock Inlet Sediment Trap Type B
1606.01	Special Sediment Control Fence	1632.03	Rock Inlet Sediment Trap Type C
1607.01	Gravel Construction Entrance	1633.01	Temporary Rock Silt Check Type A
1622.01	Temporary Berms and Slope Drains	1633.02	Temporary Rock Silt Check Type B
1630.01	Riser Basin	1634.01	Temporary Rock Sediment Dam Type A
1630.02	Silt Basin Type B	1634.02	Temporary Rock Sediment Dam Type B
1630.03	Temporary Silt Ditch	1635.01	Rock Pipe Inlet Sediment Trap Type A
1630.04	Stilling Basin	1635.02	Rock Pipe Inlet Sediment Trap Type B
1630.05	Temporary Diversion	1640.01	Coir Fiber Baffle
1630.06	Special Stilling Basin	1645.01	Temporary Stream Crossing
1631.01	Matting Installation		

TIP PROJECT: 17BP.7.R.93

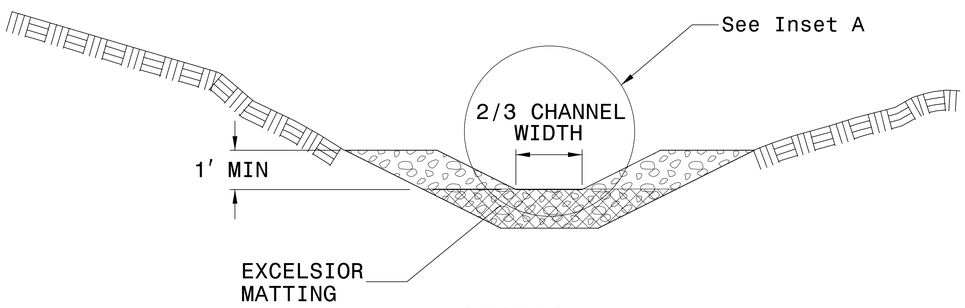
9/22/2016
ICA ENGINEERING, INC.

PROJECT REFERENCE NO.	SHEET NO.
17BP.7.R.93	EC-2
R/W SHEET NO.	

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



PLAN



SECTION A-A

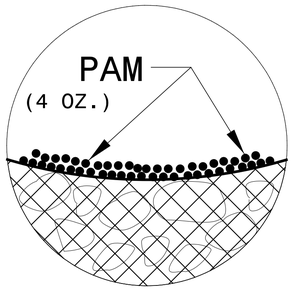
NOTES:

INSTALL TEMPORARY ROCK SILT CHECK TYPE A IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1633.01.

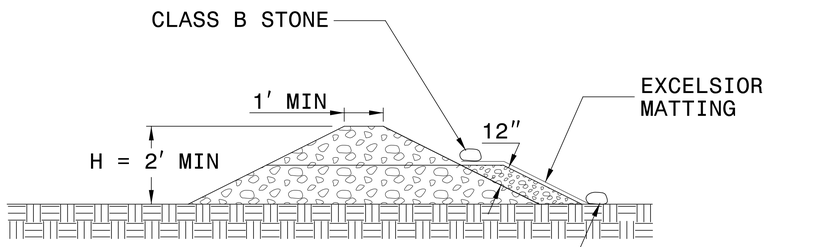
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.

INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION B-B

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
17BP.7.R.93	EC-3

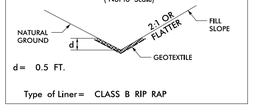
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES.

*DESIGN EXCEPTION:
MIN. HORIZONTAL CURVE RADIUS
SAG VERTICAL CURVE K
HORIZONTAL SSD
VERTICAL SSD
SUPERELEVATION

DETAIL A
TOE PROTECTION
(Not to Scale)



d= 0.5 FT.

Type of Liner= CLASS B RIP RAP

-L- STA. 12+30 TO 12+62 RT
-L- STA. 14+50 TO 15+05 RT

DETAIL B
TOE PROTECTION
(Not to Scale)

d= 1 FT.
b= 2 FT.

Type of Liner= CLASS B RIP RAP

-L- STA. 12+95 TO 13+43 LT

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 04

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	EC-04/CONST.04

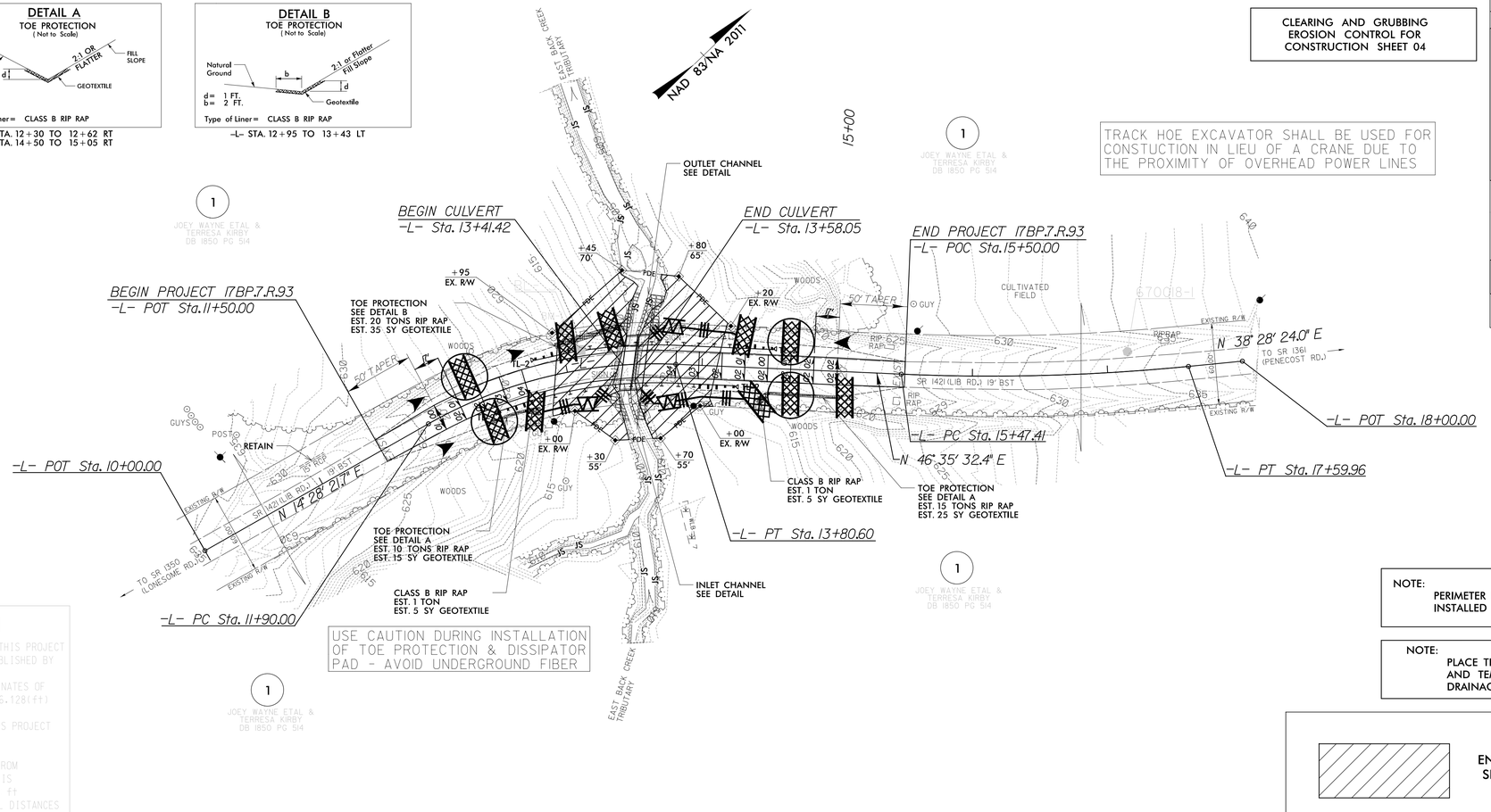
ROADSIDE ENVIRONMENTAL PROJECT ENGINEER

LEVEL III CERTIFIED BY:
ALEXANDER D. SNIDER, PE
CERTIFICATION NUMBER: 3064
ISSUED: OCTOBER 5, 2016

Prepared in the Office of:
MOTT MACDONALD
PO Box 700
Fuquay-Varina, NC 27526
www.mottmac.com

VERTICAL SCALE 5' 0 5' 10'
HORIZONTAL SCALE 25' 0 25' 50'

HDR | ICA
5121 Kingsdown Way, Suite 100
Raleigh, NC 27607
NC License No: P1004



TRACK HOE EXCAVATOR SHALL BE USED FOR CONSTUCTION IN LIEU OF A CRANE DUE TO THE PROXIMITY OF OVERHEAD POWER LINES

USE CAUTION DURING INSTALLATION OF TOE PROTECTION & DISSIPATOR PAD - AVOID UNDERGROUND FIBER

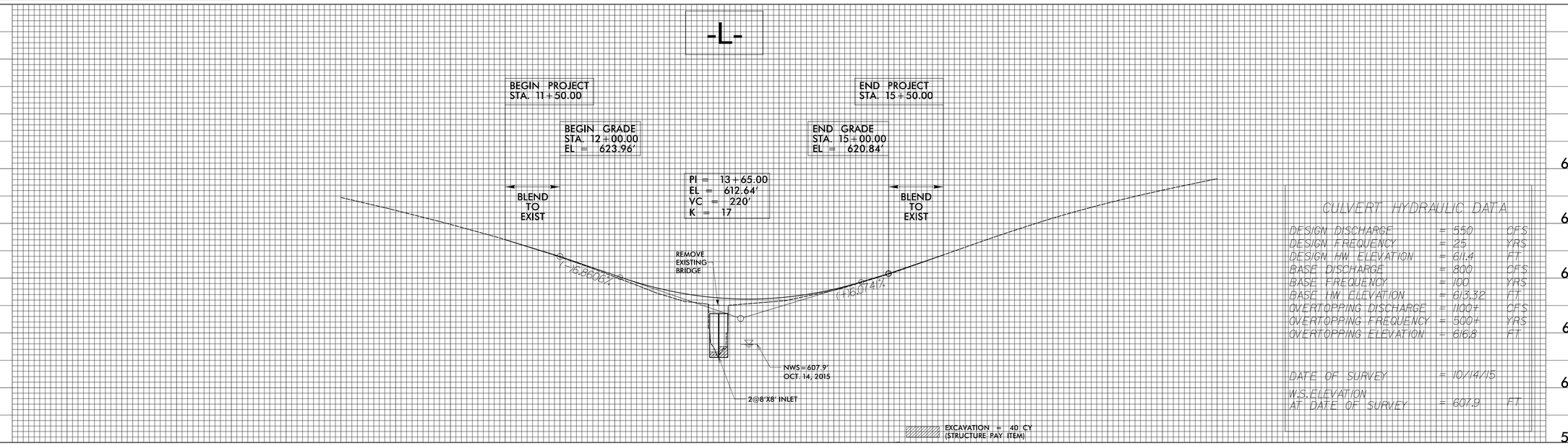
NOTE:
PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE – B AND TEMPORARY ROCK SILT CHECKS TYPE – A AT DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "670018-1" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 882511.209(ft) EASTING: 1933716.128(ft) ELEVATION: 633.67(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999767200
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "670018-1" TO -L- STATION 10+00.00 IS N 31° 53' 23.3" E DISTANCE: 697.59 ft
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 550	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 611.4	FT
BASE DISCHARGE	= 800	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 613.32	FT
OVERTOPPING DISCHARGE	= 1100+	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 616.8	FT
DATE OF SURVEY	= 10/14/15	
W.S.ELEVATION AT DATE OF SURVEY	= 607.9	FT

$$DATE$$
10/12/2016
P:\Hydro\DOC\Orange_018\Hydraulics\Erosion Control\eadd\670018_hyd_psh_C&G.dgn
ICA ENGINEERING, INC.

8/17/99

HDR | ICA
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

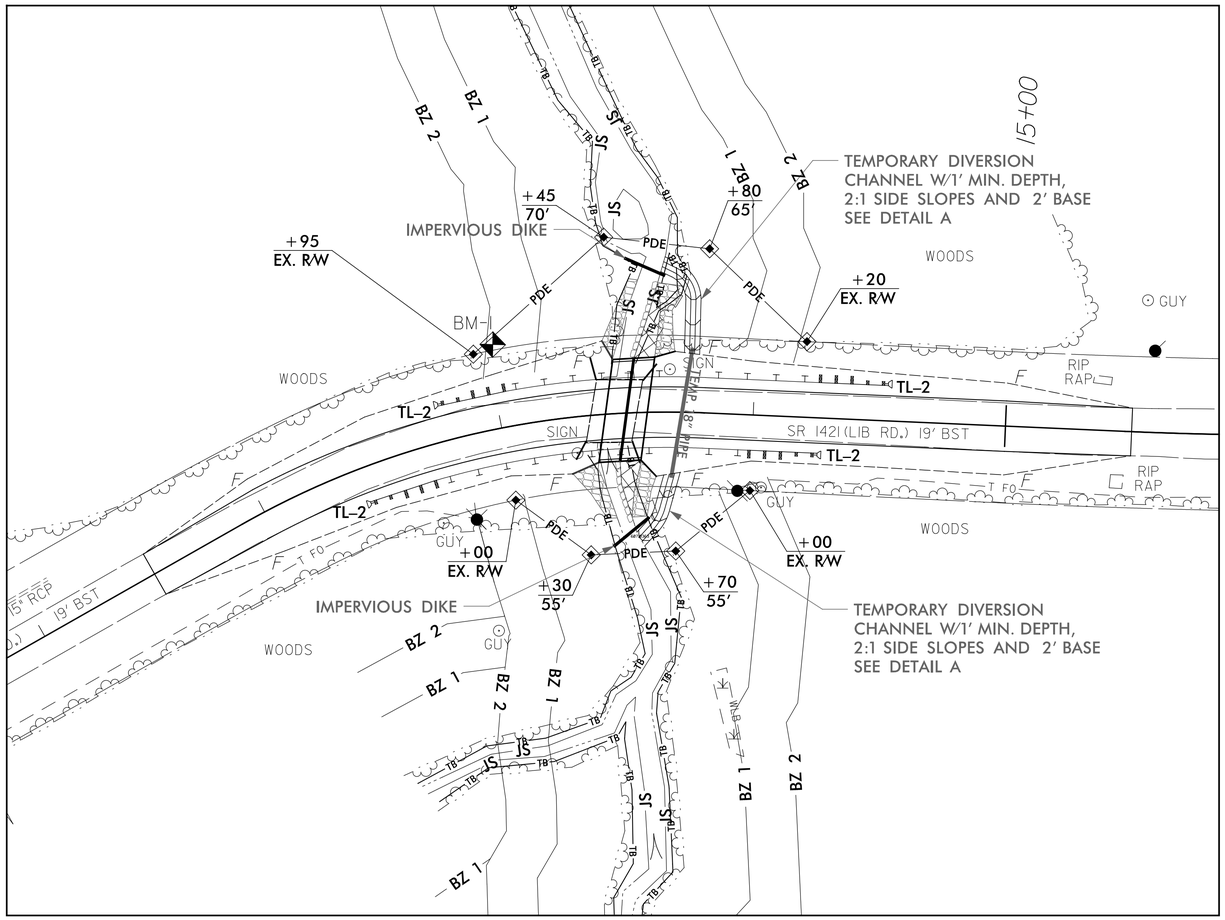
PROJECT REFERENCE NO.	SHEET NO.
17BP.7.R.93	EC-04A/CONST.04
R/W SHEET NO.	

ROADSIDE ENVIRONMENTAL PROJECT ENGINEER

LEVEL III CERTIFIED BY:
ALEXANDER D. SNIDER, PE
CERTIFICATION NUMBER: 3064
ISSUED: OCTOBER 5, 2016

NAD 83/NA 2011

GRAPHIC SCALE
30 0 30 60



CULVERT PHASING
SF–670018

PHASE 1

1.) EXCAVATE TEMPORARY DIVERSION CHANNEL (75 LF), INSTALL 18" TEMPORARY PIPE (51 LF) AND IMPERVIOUS DIKES (34 LF) AS SHOWN. DIVERT FLOW THROUGH TEMPORARY DIVERSION DITCHES AND TEMPORARY PIPE.

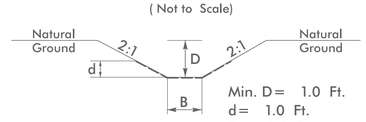
2.) INSTALL SPECIAL STILLING BASIN WITHIN PROJECT RIGHT–OF–WAY. PUMP ALL EFFLUENT INTO SPECIAL STILLING BASIN.

3.) DE–WATER EFFLUENT FROM WORK SITE INTO SPECIAL STILLING BASIN. CONSTRUCT 2 @ 8' X 8' RCBC w/SILLS. CONSTRUCT UPSTREAM AND DOWNSTREAM CHANNEL IMPROVEMENTS AND PLACE REQUIRED RIP RAP.

4.) REMOVE IMPERVIOUS DIKES, SPECIAL STILLING BASIN, AND TEMPORARY DIVERSION. DIRECT FLOW THROUGH NEWLY CONSTRUCTED CULVERTS.

5.) UPON STABILIZATION OF ALL DISTURBED AREAS, REMOVE ALL TEMPORARY SEDIMENT CONTROL DEVICES.

DETAIL A
TEMPORARY DIVERSION CHANNEL
(Not to Scale)



Type of Liner= GEOTEXTILE FOR SOIL STABILIZATION, TYPE 4

10/5/2016
67001B-Phd_EC_Construction_Sequence.dgn
ICA ENGINEERING, INC.

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	EC-05/CONST.04

ROADSIDE ENVIRONMENTAL PROJECT ENGINEER

LEVEL III CERTIFIED BY:
ALEXANDER D. SNIDER, PE
CERTIFICATION NUMBER: 3064
ISSUED: OCTOBER 5, 2016

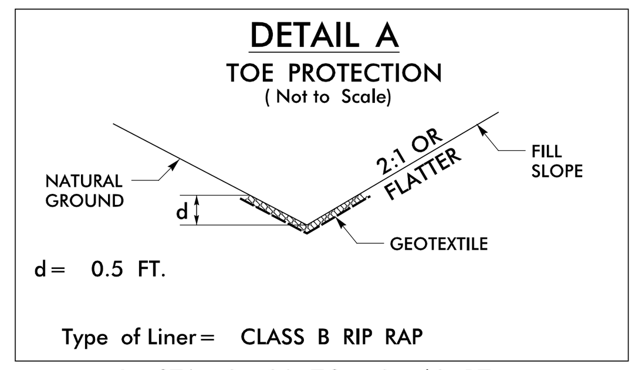
Prepared in the Office of: MOTT MACDONALD, PO Box 700, Fuquay–Varina, NC 27526, www.mottmac.com

HDR | ICA — 5121 Kingdom Way, Suite 100, Raleigh, NC 27607, NC License No: F-0258

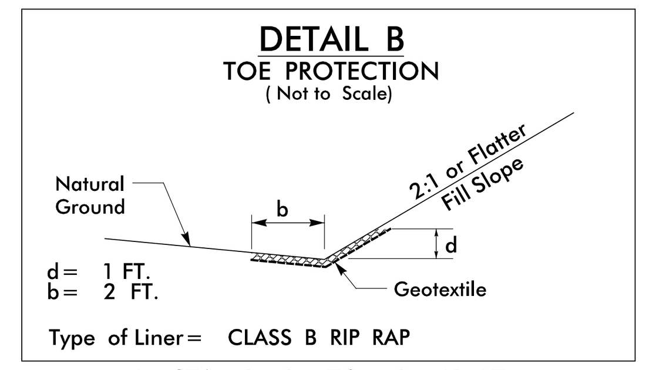
VERTICAL SCALE 5' 0 5' 10' — HORIZONTAL SCALE 25' 0 25' 50'

FINAL GRADE EROSION CONTROL FOR CONSTRUCTION SHEET 04

*DESIGN EXCEPTION:
- MIN. HORIZONTAL CURVE RADIUS
- SAG VERTICAL CURVE K
- HORIZONTAL SSD
- VERTICAL SSD
- SUPERELEVATION

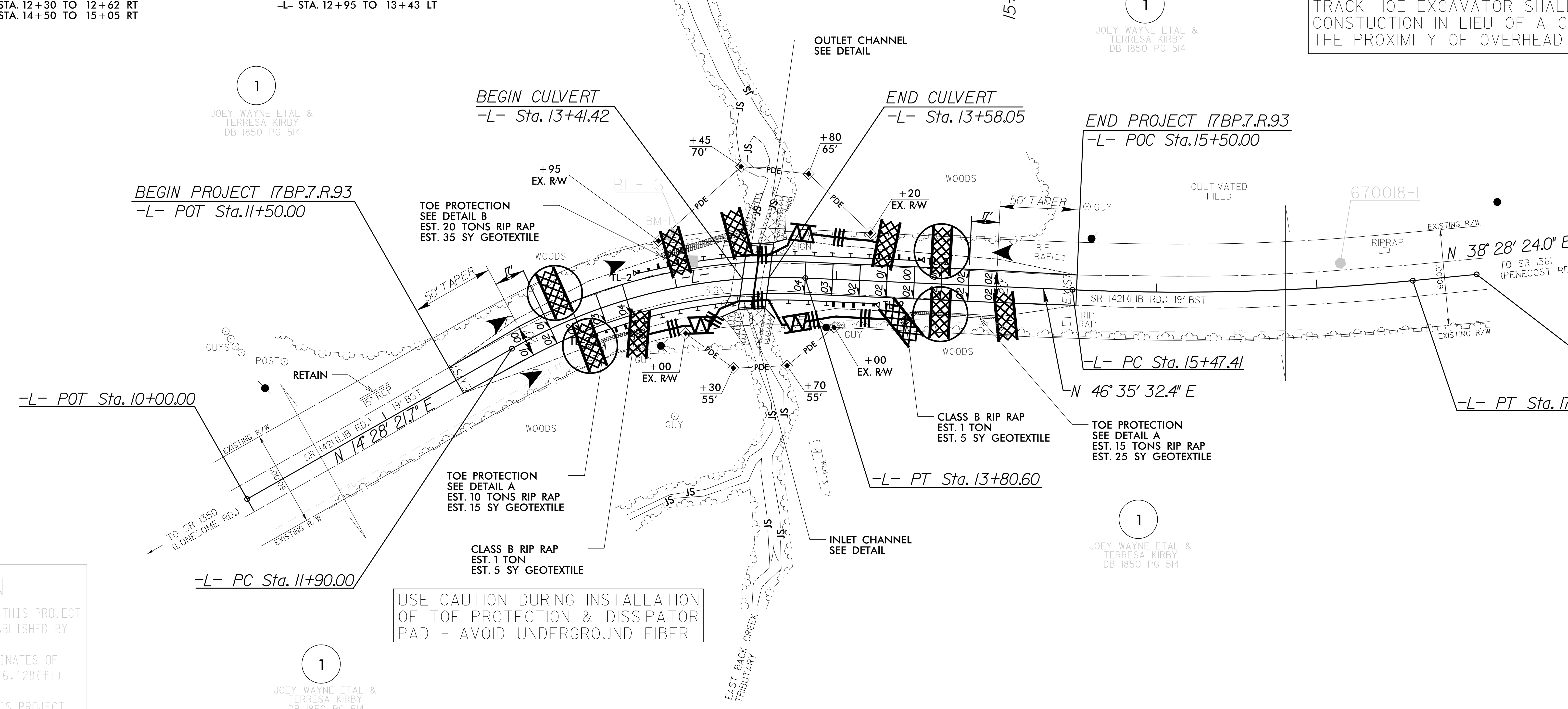


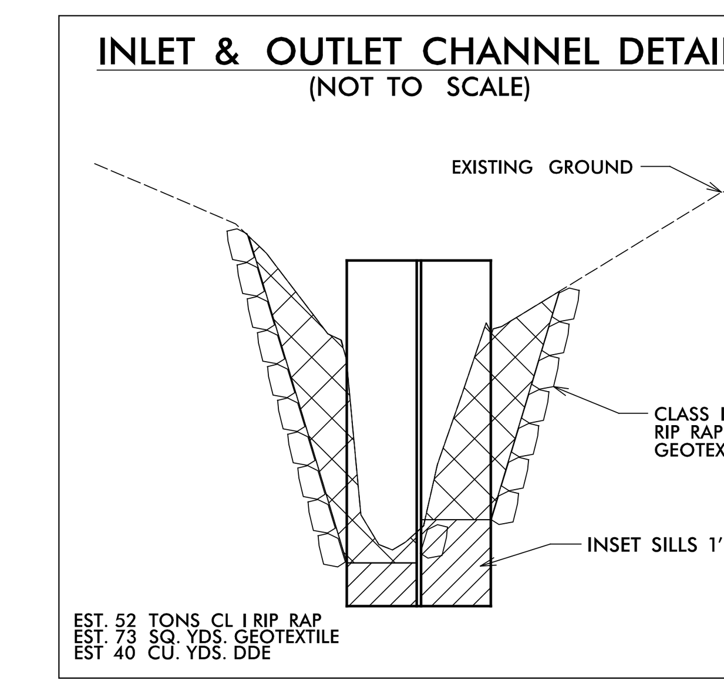
–L– STA. 12+30 TO 12+62 RT
–L– STA. 14+50 TO 15+05 RT



–L– STA. 12+95 TO 13+43 LT

TRACK HOE EXCAVATOR SHALL BE USED FOR CONSTUCTION IN LIEU OF A CRANE DUE TO THE PROXIMITY OF OVERHEAD POWER LINES





DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "670018-1"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 882511.209(ft) EASTING: 1933716.128(ft)
ELEVATION: 633.67(ft)
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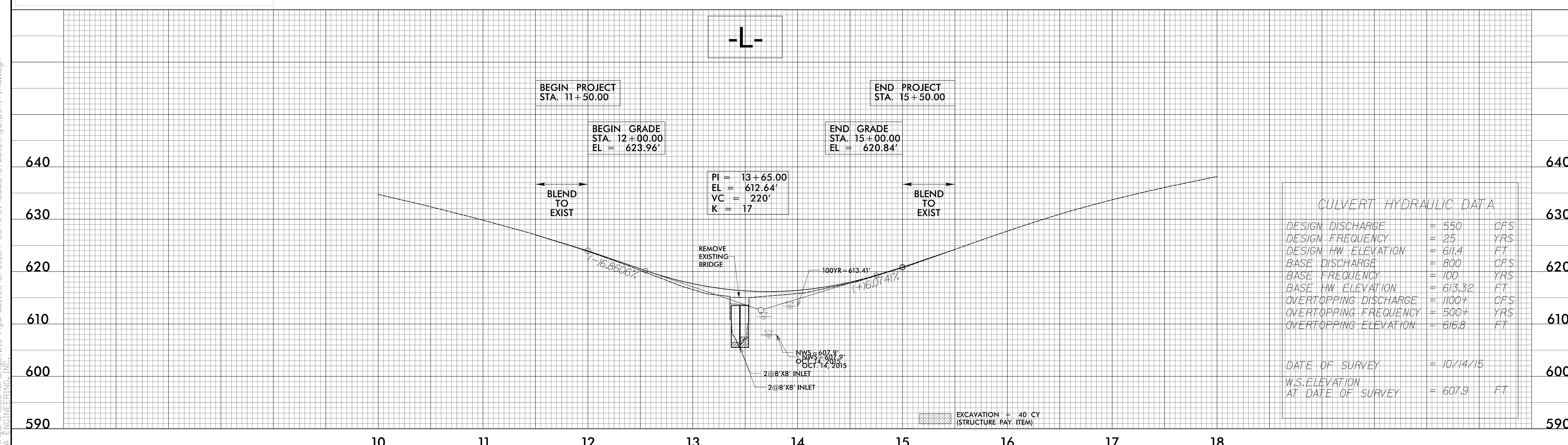

CULVERT HYDRAULIC DATA

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DESIGN FREQUENCY	=	25	YRS
DESIGN HW ELEVATION	=	611.4	FT
BASE DISCHARGE	=	800	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	613.32	FT
OVERTOPPING DISCHARGE	=	1100+	CFS
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING ELEVATION	=	616.8	FT
DATE OF SURVEY	=	10/14/15	
W.S.ELEVATION AT DATE OF SURVEY	=	607.9	FT

$$DATE$$
10/12/2016
P:\Hydro\DDC\Orange_018\Hydraulics\Erosion Control\cadd\670018_hyd_psh_final.dgn
ICA ENGINEERING, INC.

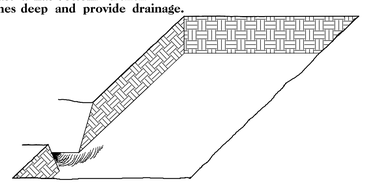
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.7.R.93	RF-1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

PLANTING DETAILS

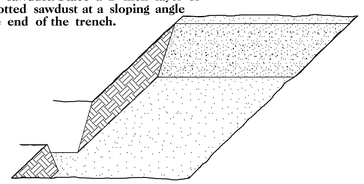
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

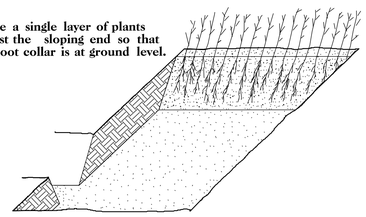
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



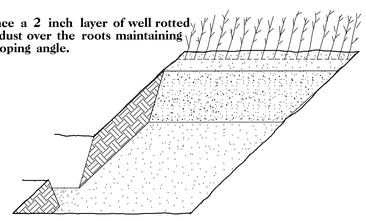
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

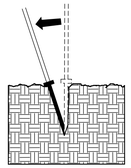


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

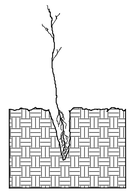


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

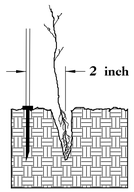
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



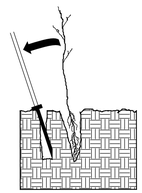
1. Insert planting bar as shown and pull handle toward planter.



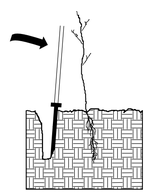
2. Remove planting bar and place seedling at correct depth.



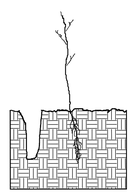
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

25% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in – 18 in BR
25% PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	12 in – 18 in BR
25% FRAXINUS PENNSYLVANICA	GREEN ASH	12 in – 18 in BR
25% BETULA NIGRA	RIVER BIRCH	12 in – 18 in BR

REFORESTATION DETAIL SHEET

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

*DESIGN EXCEPTION:
MIN. HORIZONTAL CURVE RADIUS
SAG VERTICAL CURVE K
HORIZONTAL SSD
VERTICAL SSD
SUPERELEVATION

DETAIL A
TOE PROTECTION
(Not to Scale)

d= 0.5 FT.

Type of Liner= CLASS B RIP RAP

-L- STA. 12+30 TO 12+62 RT
-L- STA. 14+50 TO 15+05 RT

DETAIL B
TOE PROTECTION
(Not to Scale)

d= 1 FT.
b= 2 FT.

Type of Liner= CLASS B RIP RAP

-L- STA. 12+95 TO 13+43 LT

NAD 83/NA 2011

TRACK HOE EXCAVATOR SHALL BE USED FOR CONSTUCTION IN LIEU OF A CRANE DUE TO THE PROXIMITY OF OVERHEAD POWER LINES

EXIST. U/G FIBER OPTIC TELEPHONE TO REMAIN

JOEY WAYNE ETAL & TERRESA KIRBY DB 1850 PG 514

BEGIN CULVERT
-L- Sta. 13+41.42

END CULVERT
-L- Sta. 13+58.05

END PROJECT 17BP.7.R.93
-L- POC Sta.15+50.00

BEGIN PROJECT 17BP.7.R.93
-L- POT Sta.11+50.00

TOE PROTECTION
SEE DETAIL B
EST. 20 TONS RIP RAP
EST. 35 SY GEOTEXTILE

OUTLET CHANNEL
SEE DETAIL

BL- 3

BM-1

50' TAPER

WOODS

CULTIVATED FIELD

670018-1

EXIST. O/H POWER LINES

N 38° 28' 24.0" E

TO SR 1361 (PENECOST RD.)

SR 1421 (LIB RD.) 19' BST

EXISTING R/W

RIPRAP

-L- POT Sta. 18+00.00

-L- PC Sta. 15+47.41

N 46° 35' 32.4" E

-L- PT Sta. 17+59.96

GUYS

POST

RETAIN

-L- POT Sta. 10+00.00

N 14° 28' 21.7" E

TO SR 1350 (LONESOME RD.)

EXISTING R/W

-L- PC Sta. 11+90.00

TOE PROTECTION
SEE DETAIL A
EST. 10 TONS RIP RAP
EST. 15 SY GEOTEXTILE

CLASS B RIP RAP
EST. 1 TON
EST. 5 SY GEOTEXTILE

-L- PT Sta. 13+80.60

CLASS B RIP RAP
EST. 1 TON
EST. 5 SY GEOTEXTILE

TOE PROTECTION
SEE DETAIL A
EST. 15 TONS RIP RAP
EST. 25 SY GEOTEXTILE

EXIST. U/G FIBER OPTIC TELEPHONE TO REMAIN

INLET CHANNEL
SEE DETAIL

JOEY WAYNE ETAL & TERRESA KIRBY DB 1850 PG 514

EXIST. O/H FIBER OPTIC TEL. TO REMAIN

USE CAUTION DURING INSTALLATION OF TOE PROTECTION & DISSIPATOR PAD - AVOID UNDERGROUND FIBER

EXIST. O/H POWER TO REMAIN

EAST BACK CREEK TRIBUTARY

JOEY WAYNE ETAL & TERRESA KIRBY DB 1850 PG 514

JOEY WAYNE ETAL & TERRESA KIRBY DB 1850 PG 514

DATUM DESCRIPTION

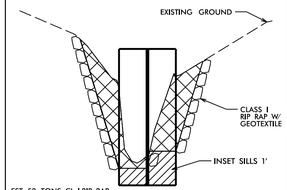
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "670018-1" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 882511.209(ft) EASTING: 1933716.128(ft) ELEVATION: 633.67(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999767200
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "670018-1" TO -L- STATION 10+00.00 IS N 31° 53' 23.3" E DISTANCE: 697.59 ft
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BM #1 ELEVATION = 620.00
N 882224 E 1933413
BL STATION 5+00.00
N 84°32'46.88" W DIST 21.30'
BENCH TIE SPIKE IN 26" OAK

-L-

PI Sta 12+87.88	PI Sta 16+53.86
Δ = 32° 07' 10.8" (RT)	Δ = 8° 07' 08.5" (LT)
D = 16° 51' 06.1"	D = 3° 49' 11.0"
L = 190.60'	L = 212.56'
T = 97.88'	T = 106.46'
R = 340.00'	R = 1,500.00'

INLET & OUTLET CHANNEL DETAIL
(NOT TO SCALE)



EST. 52 TONS CL I RIP RAP
EST. 75 SQ YDS GEOTEXTILE
EST. 40 CU YDS DDE

BL

POINT	DESC.	NORTH	EAST	ELEVATION	BL STATION
3	BL-3	882221.4951	1933434.1446	615.22	5+00.00
1	670018-1	882511.2090	1933716.1280	633.67	9+04.29
2	670018-2	883246.8620	1934296.1800	662.31	18+41.12

PROJECT REFERENCE	SHEET NO.
17BP.7.R.93 – ORANGE 18	UO-1

Prepared in the Office of:
THE WOOTEN COMPANY
LICENSE NO. F-0115

THE WOOTEN COMPANY
ENGINEERING | PLANNING | ARCHITECTURE
120 North Boylan Avenue Raleigh NC 27603-1423
919.828.0531 fax 919.834.3589

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALE
25' 0 25' 50'

UTILITIES BY OTHERS

NOTE:
ALL UTILITY FACILITIES TO REMAIN IN PLACE. CONTACT UTILITY OWNER IN THE EVENT OF DAMAGE TO THE UTILITY.

10/1/2016
4:40:24 PM
T:\Projects\Hatch_Mott_MacDonald-3160\D\17BP7R93_Orange#18\CADD\Ub0.dgn
jharris

0 5 10	PROJECT REFERENCE	SHEET NO.
	17BP.7.R.93 – ORANGE 18	X–1

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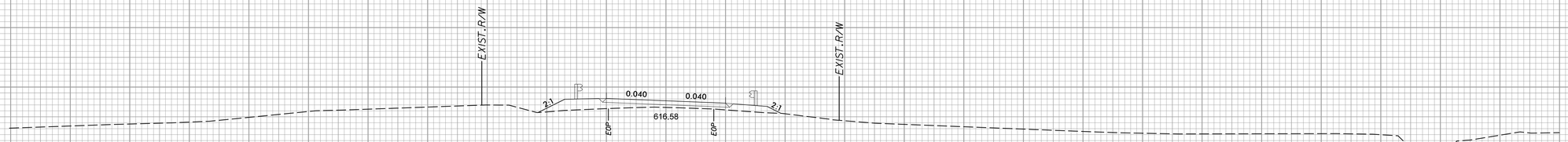
BEGIN CULVERT 13+41.42

640 630 620 610 600



13+00.00

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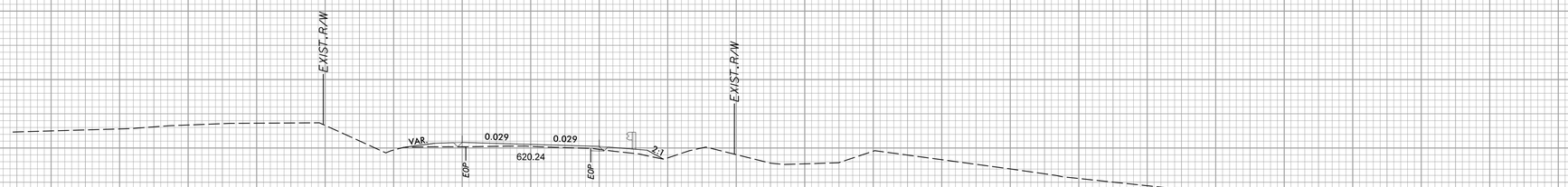

12+50.00

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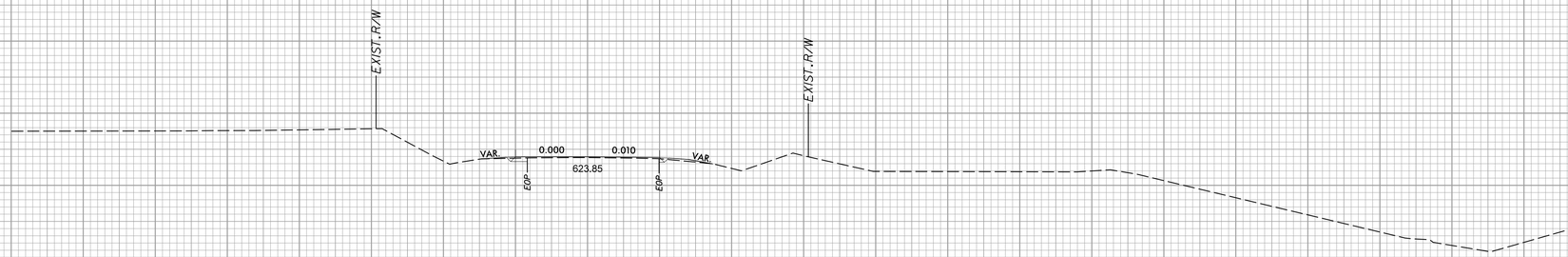
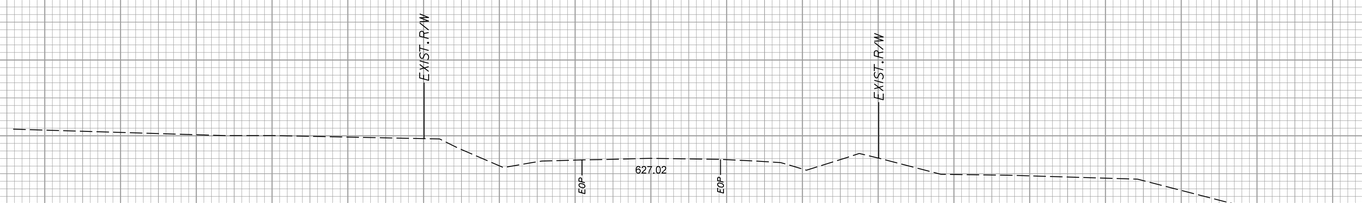


12+00.00

650 640 630 620 610

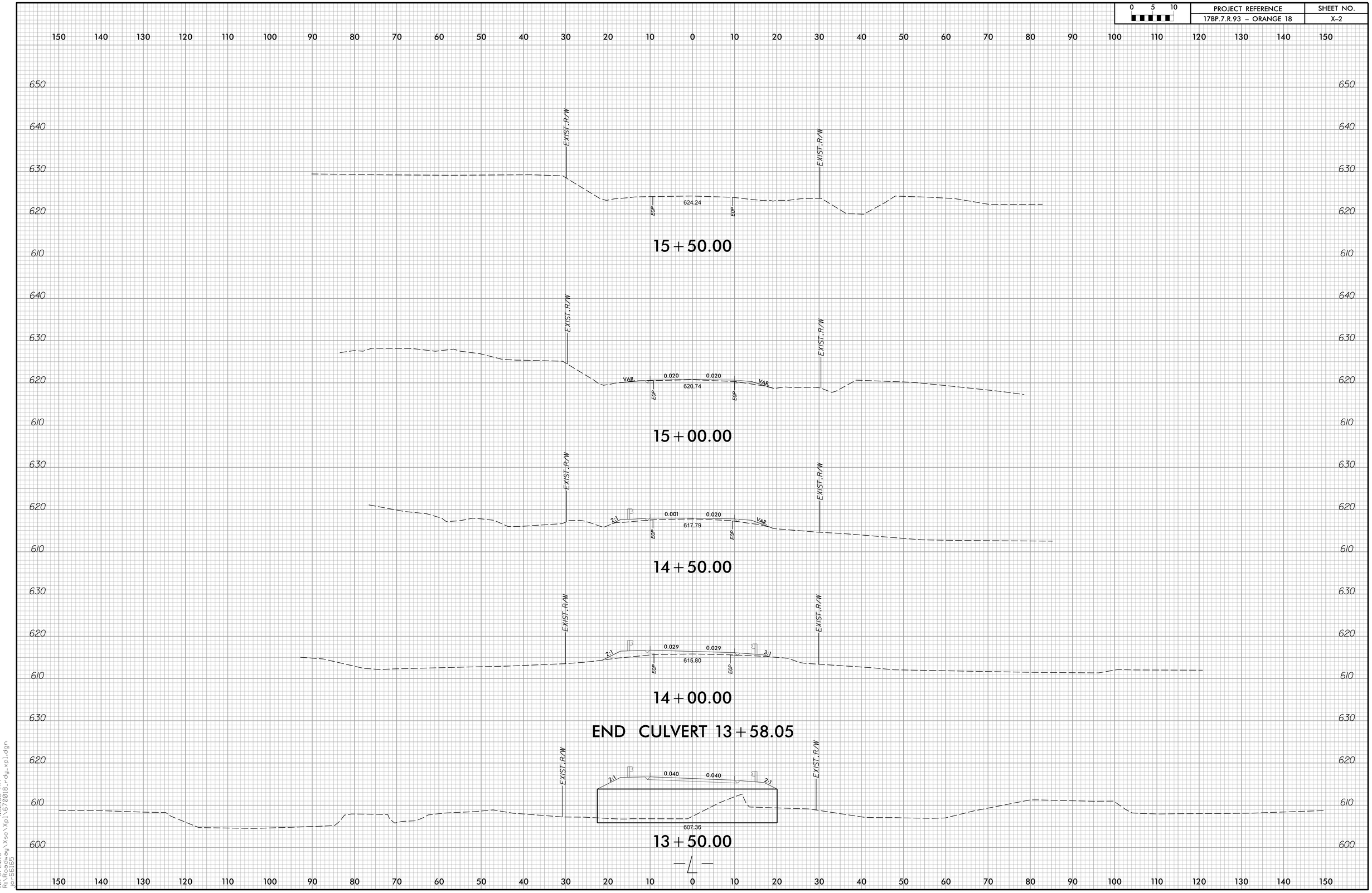


11+50.00

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10/5/2016 9:32:35 AM
R:\Roadway\Xsc\Xpl\670018_rdy_xpl.dgn
jor66165

0 5 10	PROJECT REFERENCE	SHEET NO.
	17BP.7.R.93 – ORANGE 18	X–2



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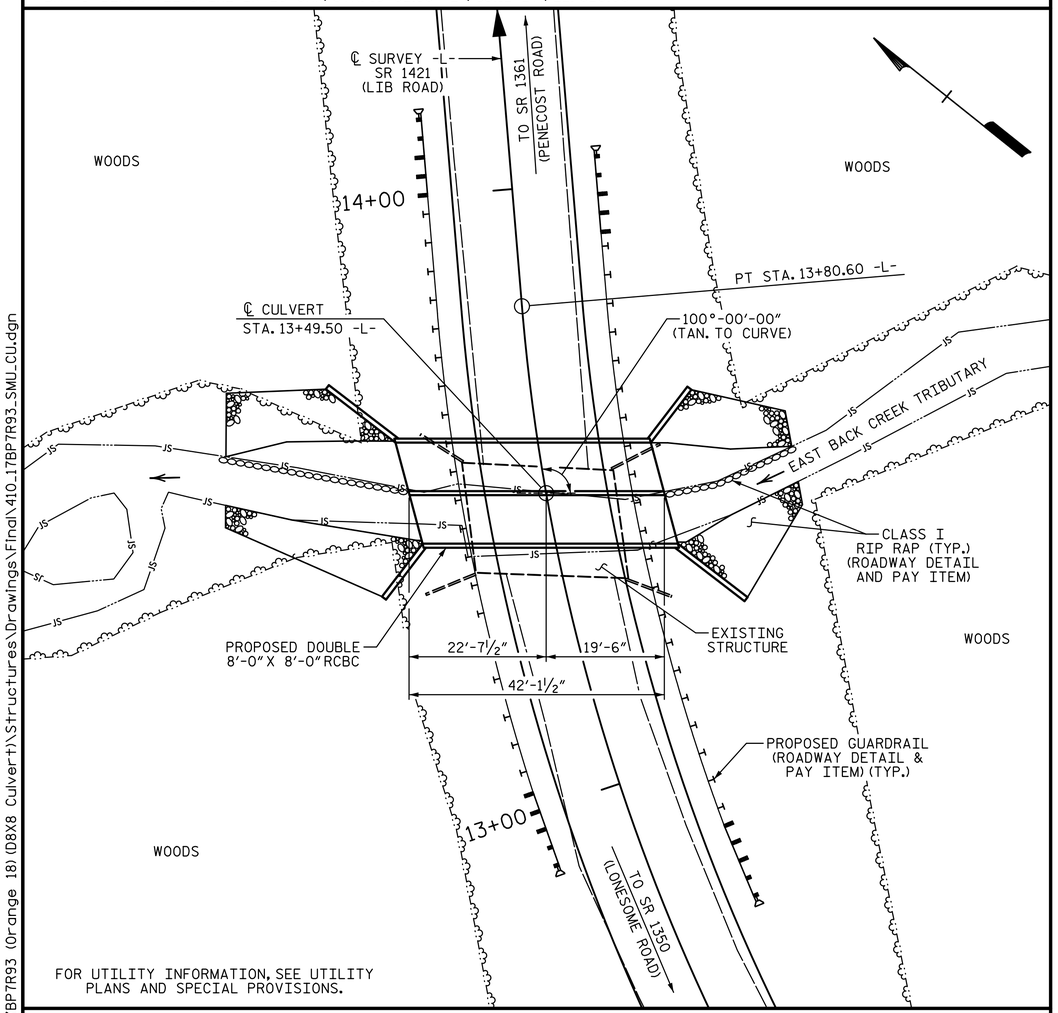
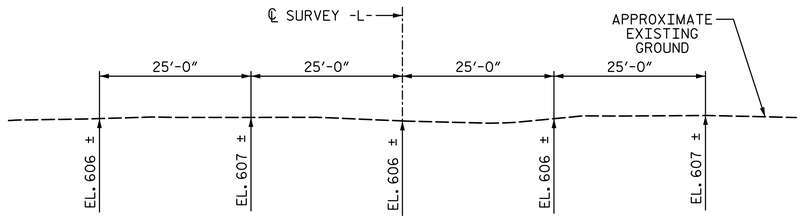


LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

DRAWN BY: T. BANKOVICH DATE: 6-16
CHECKED BY: B.S. COX DATE: 6-16
DESIGN ENGINEER OF RECORD: B.S. COX DATE: 6-16

10/10/2016 10:28:44 AM G:\Projects\2015\Division 7 (Hatch Mott)\17BP7R93 (Orange 18)(D8X8 Culvert)\Structures\Drawings\Final\410_17BP7R93_SMU_CU.dgn

HYDRAULIC DATA:

DESIGN DISCHARGE	= 550 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YEAR
DESIGN HIGH WATER ELEVATION	= 611.40
DRAINAGE AREA	= 1.0 SQ. MI.
BASE DISCHARGE (Q 100)	= 800 CFS
BASE HIGH WATER ELEVATION	= 613.32

OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	= 1100+ CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YEAR
OVERTOPPING FLOOD ELEVATION	= 616.80 ✳✳

✳✳ OVERTOPPING OCCURS AT ROADWAY SAG AT STA. 13+71.70 -L-

HORIZONTAL CURVE DATA

PI STA. 12+87.88 -L-
Δ = 32°-07'-10.8" (RT.)
D = 16°-51'-06.1"
L = 190.60'
T = 97.88'
R = 340.00'

GRADE DATA:

GRADE POINT EL. @ STA. 13+49.50 -L- = EL. 616.33
BED EL. @ STA. 13+49.50 -L- = 605.40
ROADWAY SLOPE 2:1

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	1.990	CY/FT	83.8 C.Y.
HEADWALLS			1.7 C.Y.
SILLS			1.8 C.Y.
WING ETC.			24.5 C.Y.
TOTAL			111.8 C.Y.
REINFORCING STEEL			
BARREL			10,461 LBS.
WINGS ETC.			1,547 LBS.
TOTAL			12,008 LBS.
CULVERT EXCAVATION			LUMP SUM
FOUNDATION CONDITIONING MATERIAL			66 TONS
REMOVAL OF EXISTING STRUCTURE			LUMP SUM
ASBESTOS ASSESSMENT			LUMP SUM

FOUNDATION NOTES:

EXCAVATE A MINIMUM OF 1.0 FT. BELOW BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

OVEREXCAVATE LOOSE/SOFT MATERIAL IF PRESENT TO SUITABLE BEARING MATERIALS AND REPLACE WITH ADDITIONAL CLASS VI FOUNDATION CONDITIONING MATERIAL. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.

WHERE EXCAVATION EXTENDS INTO CRYTALLINE ROCK, A MINIMUM OF 6 INCHES OF FOUNDATION CONDITIONING MATERIAL IS REQUIRED.

FOR BLASTING ADJACENT TO HIGHWAY STRUCTURE, SEE ARTICLE 410-9 OF THE STANDARD SPECIFICATIONS.

NOTES:

ASSUMED LIVE LOAD ----------HL-93 OR ALTERNATE LOADING.

DESIGN FILL---------- 1'-9" (MIN.) AND 3'-6" (MAX.)

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTS OF 1 SPAN @ 18'-3" WITH A CLEAR ROADWAY WIDTH OF 24.5'. THE SUPERSTRUCTURE CONSISTS OF A TIMBER DECK ON TIMBER JOIST WITH ASPHALT WEARING SURFACE. THE MASS CONCRETE ABUTMENTS WERE WIDENED WITH TIMBER CAP ON CONCRETE ENCASED TIMBER PILES. THE EXISTING STRUCTURE, WHICH IS LOCATED AT THE SITE OF THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, THE LOAD LIMIT MAY BE REDUCED AS NECESSARY DURING THE LIFE OF THE PROJECT.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

TRACK HOE EXCAVATOR SHALL BE USED FOR CONSTRUCTION IN LIEU OF A CRANE DUE TO THE PROXIMITY OF OVERHEAD POWER LINES.

CULVERT MUST BE CAST-IN-PLACE, PRECAST OPTION WILL NOT BE ALLOWED.

PROJECT NO. 17BP.7.R.93
ORANGE COUNTY
STATION: 13+49.50 -L-

SHEET 1 OF 5 REPLACES BRIDGE #18

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 041268 ENGINEER BETSY S. COX
10/10/2016

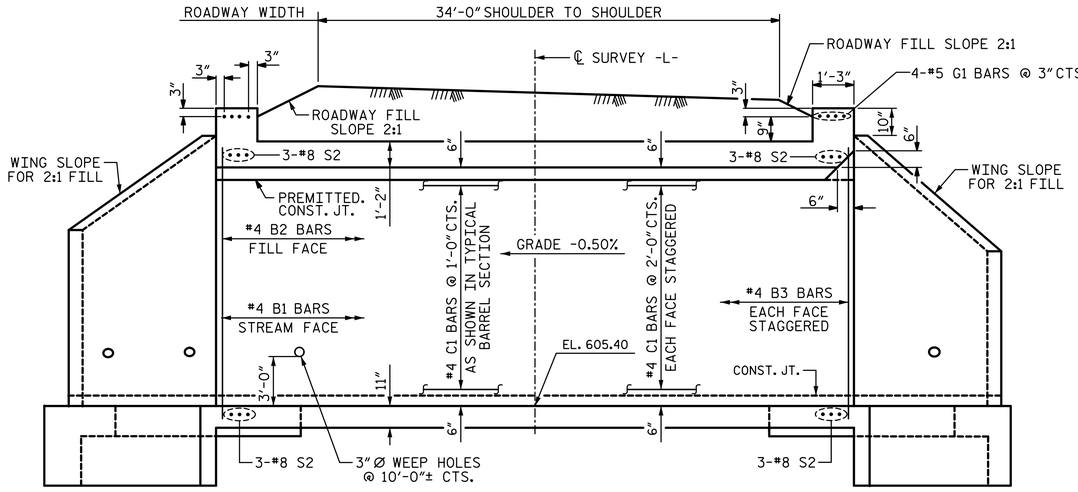
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCETE BOX CULVERT

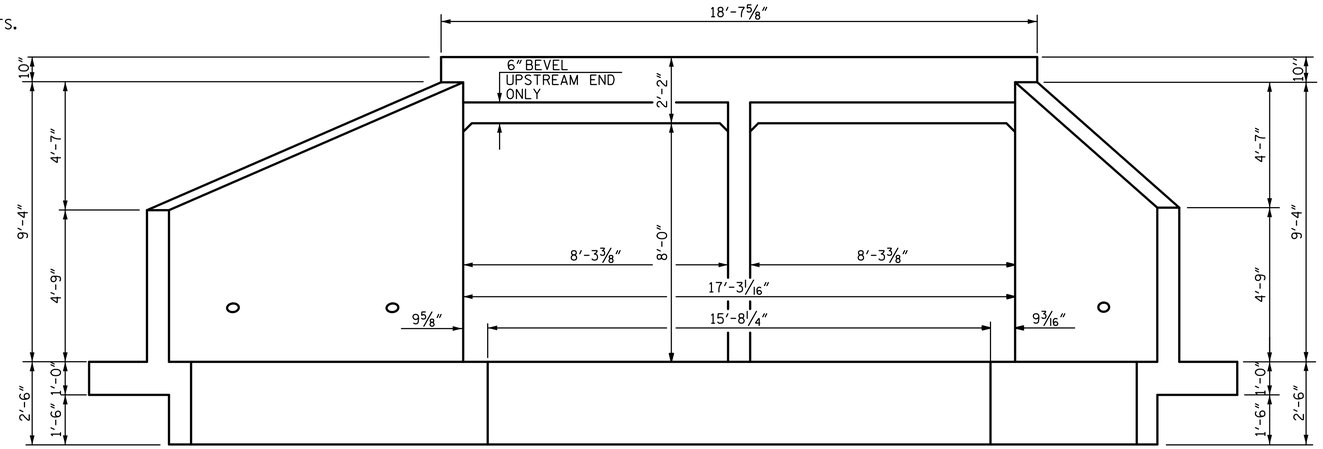
100° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			5



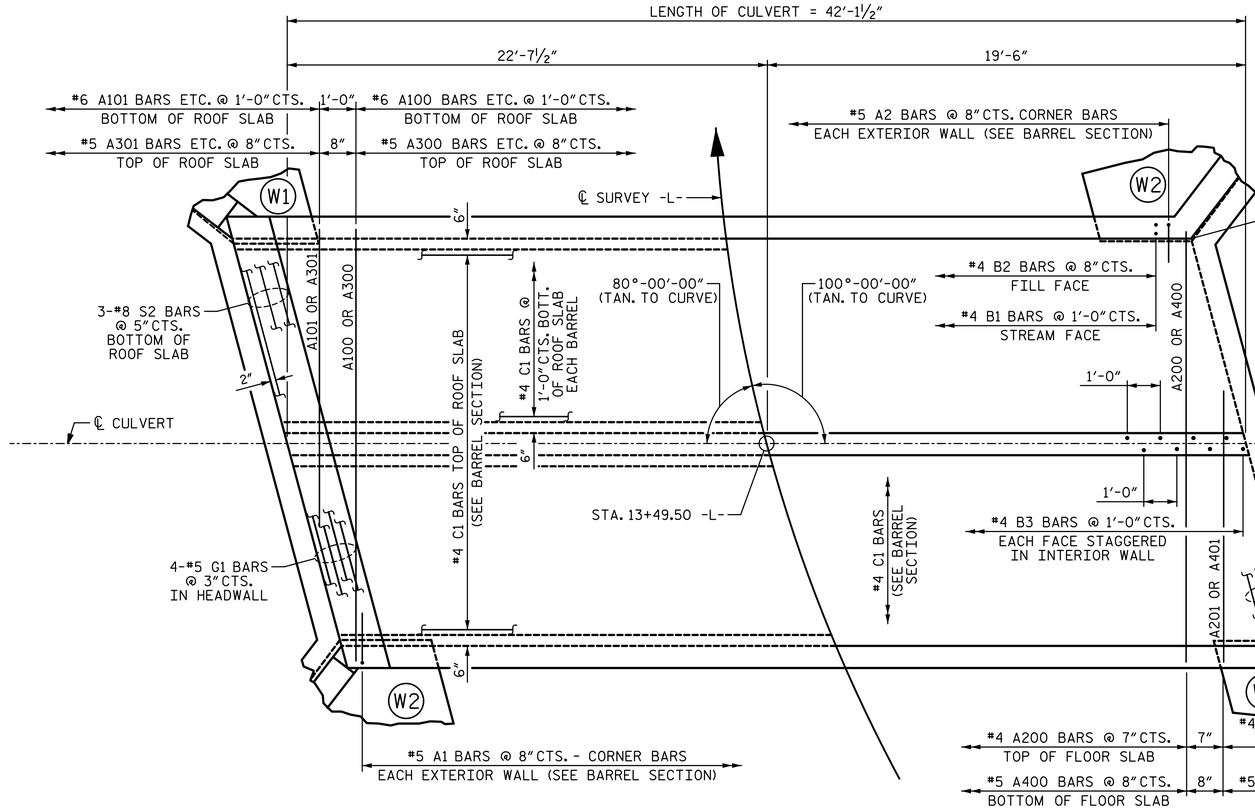
CULVERT SECTION NORMAL TO ROADWAY

(CONCRETE SILLS NOT SHOWN)



END ELEVATION - LOOKING DOWNSTREAM

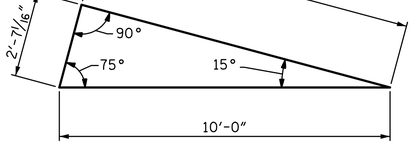
(UPSTREAM END SHOWN, DOWNSTREAM END SIMILAR)



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

(C1 BARS ARE 2 BAR RUNS) (CONCRETE SILLS NOT SHOWN FOR CLARITY)



SKEW TRIANGLE

PROJECT NO. 17BP.7.R.93

ORANGE COUNTY

STATION: 13+49.50 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT

100° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			5

DRAWN BY: T. BANKOVICH DATE: 6-16
CHECKED BY: B.S. COX DATE: 6-16
DESIGN ENGINEER OF RECORD: B.S. COX DATE: 6-16

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 21268 ENGINEER BETSY S. COX
10/10/2016

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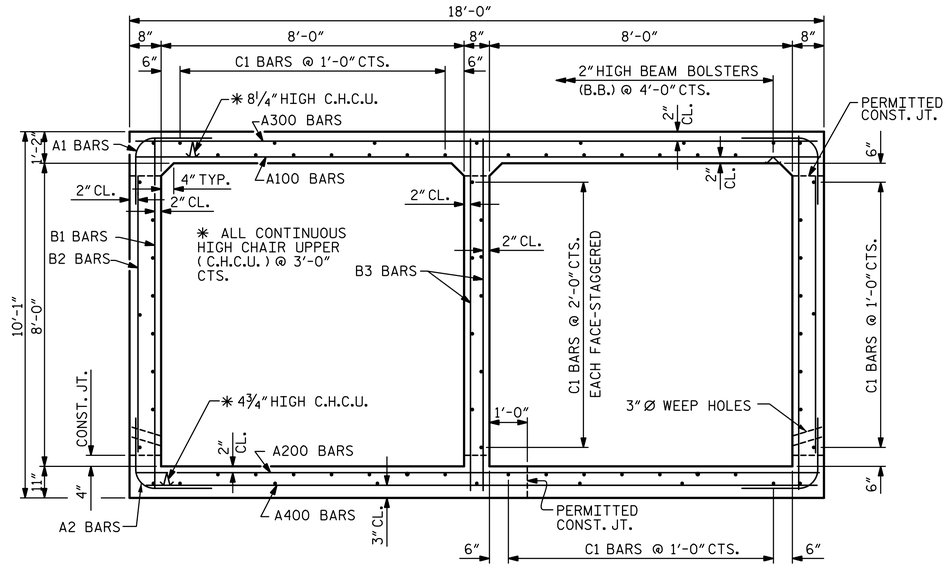
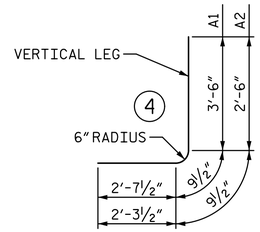
10/10/2016 10:28:44 AM G:\Projects\2015\Division 7 (Hatch Mott)\17BP7R93 (Orange 18) (8X8 Culvert)\Structures\Drawings\Final\410_17BP7R93_SMLCU.dgn



SECTION OF BARREL

(THERE ARE 72 "C" BARS IN SECTION OF BARREL)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

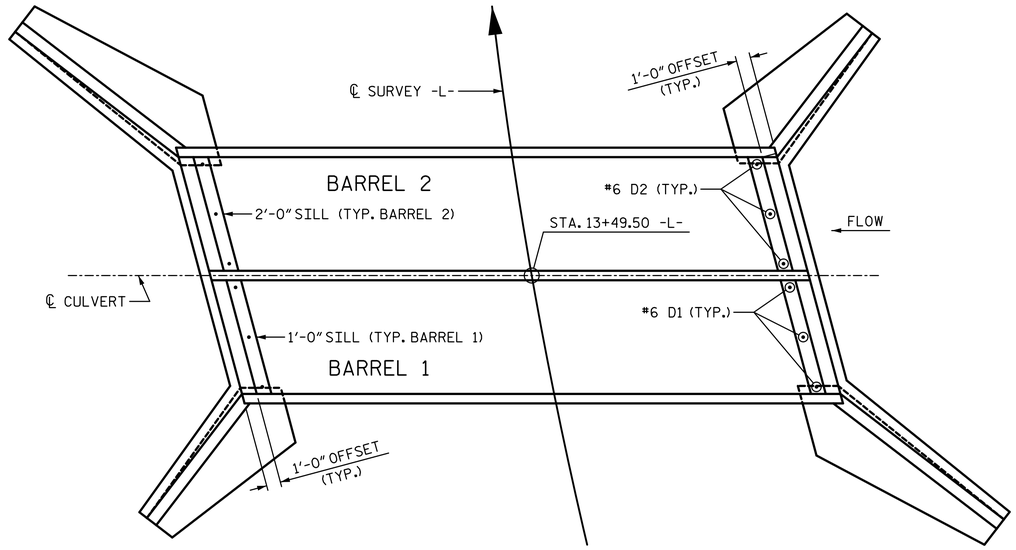
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	128	5	4	6'-11"	923
A2	128	5	4	5'-7"	745
A100	38	6	STR	17'-7"	1004
A101	2	6	STR	13'-5"	40
A102	2	6	STR	9'-9"	29
A103	2	6	STR	6'-0"	18
A104	2	6	STR	2'-3"	7
A200	64	4	STR	17'-7"	752
A201	4	4	STR	12'-10"	34
A202	4	4	STR	8'-6"	23
A203	4	4	STR	4'-1"	11
A300	56	5	STR	17'-7"	1027
A301	2	5	STR	14'-8"	31
A302	2	5	STR	12'-2"	25
A303	2	5	STR	9'-9"	20
A304	2	5	STR	7'-3"	15
A305	2	5	STR	4'-9"	10
A306	2	5	STR	2'-3"	5
A400	56	5	STR	17'-7"	1027
A401	2	5	STR	14'-8"	31
A402	2	5	STR	12'-2"	25
A403	2	5	STR	9'-9"	20
A404	2	5	STR	7'-3"	15
A405	2	5	STR	4'-9"	10
A406	2	5	STR	2'-3"	5
B1	86	4	STR	9'-7"	551
B2	128	4	STR	7'-4"	627
B3	86	4	STR	9'-7"	551
C1	144	4	STR	21'-11"	2108
D1	6	6	STR	1'-5"	13
D2	6	6	STR	2'-5"	22
G1	8	5	STR	18'-3"	152
S2	12	8	STR	18'-3"	585
TOTAL REINFORCING STEEL					10461 LB

CLASS A CONCRETE BREAKDOWN	
BARREL	83.8 CY
HEADWALLS	1.7 CY
SILLS	1.8 CY

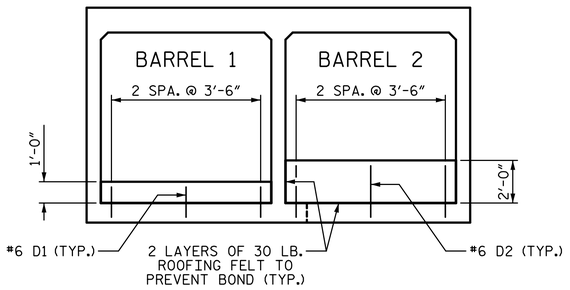
SPLICE CHART

#4 B1 SPLICE LENGTH = 1'-9"
#4 B3 SPLICE LENGTH = 1'-9"
#4 C1 SPLICE LENGTH = 1'-11"
#5 A200 SPLICE LENGTH = 2'-2"
#5 A400 SPLICE LENGTH = 2'-2"

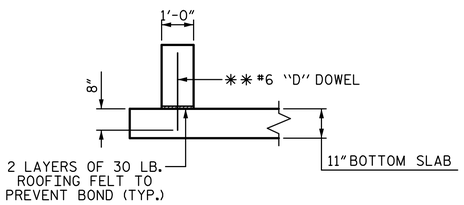


FLOOR PLAN

(SHOWING PLACEMENT OF SILLS)



ELEVATION - LOOKING DOWNSTREAM



SECTION THROUGH SILL

** DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

CULVERT SILL DETAILS

BACKFILL BARREL 1 WITH 1'-0" OF NATIVE MATERIALS
BACKFILL BARREL 2 WITH 2'-0" OF NATIVE MATERIALS
(SEE CULVERT SURVEY AND HYDRAULIC DESIGN REPORT FOR DESCRIPTION OF AND PLACEMENT OF NATIVE MATERIALS.)

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NORTH CAROLINA PROFESSIONAL SEAL 031268 ENGINEER BETSY S. COX
10/10/2016

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PROJECT NO. 17BP.7.R.93
ORANGE COUNTY
STATION: 13+49.50 -L-

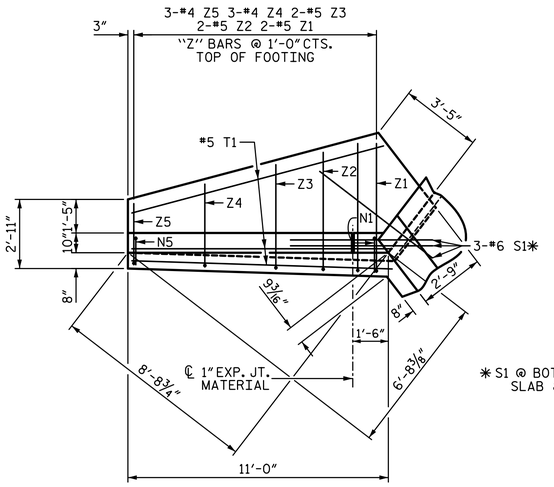
SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

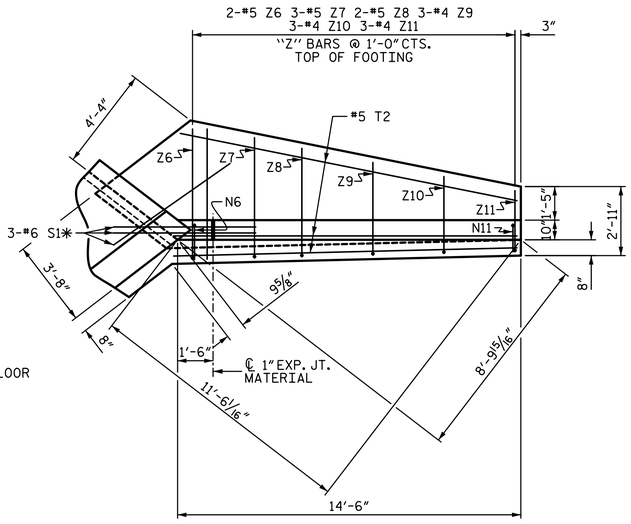
DOUBLE 8 FT. X 8 FT. CONCRETE BOX CULVERT

100° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			5



PLAN W2

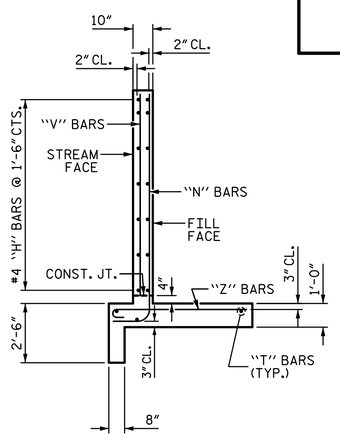


PLAN W1

* S1 @ BOTTOM OF FLOOR SLAB & FOOTING

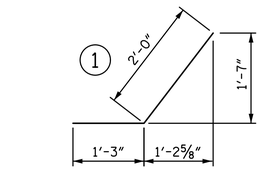
ELEVATION W2

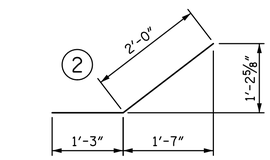
ELEVATION W1

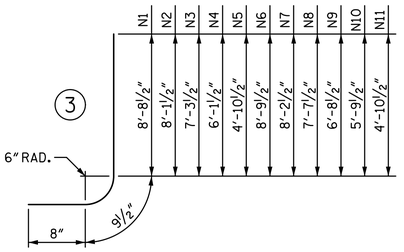


TYPICAL WING SECTION

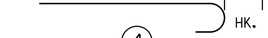
BAR TYPES







Z1	5'-5"	7"	
Z2	5'-0"	7"	
Z3	4'-5"	7"	
Z4	3'-6"	6"	
Z5	2'-7"	6"	
Z6	5'-6"	7"	
Z7	5'-1"	7"	
Z8	4'-7"	7"	
Z9	3'-11"	6"	
Z10	3'-3"	6"	
Z11	2'-7"	6"	



4

ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	4	STR	9'-1"	73
H2	4	4	STR	8'-2"	22
H3	4	4	STR	4'-5"	12
H4	24	4	1	3'-3"	52
H5	4	4	STR	9'-10"	26
H6	12	4	STR	12'-7"	101
H7	4	4	STR	11'-4"	30
H8	4	4	STR	6'-5"	17
H9	24	4	2	3'-3"	52
H10	4	4	STR	13'-2"	35
N1	4	5	3	10'-2"	42
N2	4	5	3	9'-7"	40
N3	4	5	3	8'-9"	37
N4	6	4	3	7'-7"	30
N5	6	4	3	6'-4"	25
N6	4	5	3	10'-3"	43
N7	6	5	3	9'-8"	60
N8	4	5	3	9'-1"	38
N9	6	4	3	8'-2"	33
N10	6	4	3	7'-3"	29
N11	6	4	3	6'-4"	25
S1	12	6	STR	6'-0"	108
T1	6	5	STR	11'-0"	69
T2	6	5	STR	14'-6"	91
V1	4	4	STR	8'-2"	22
V2	4	4	STR	7'-6"	20
V3	4	4	STR	6'-9"	18
V4	6	4	STR	5'-6"	22
V5	6	4	STR	4'-4"	17
V6	4	4	STR	8'-3"	22
V7	6	4	STR	7'-8"	31
V8	4	4	STR	7'-0"	19
V9	6	4	STR	6'-1"	24
V10	6	4	STR	5'-2"	21
V11	6	4	STR	4'-3"	17
Z1	4	5	4	6'-0"	25
Z2	4	5	4	5'-7"	23
Z3	4	5	4	5'-0"	21
Z4	6	4	4	4'-0"	16
Z5	6	4	4	3'-1"	12
Z6	4	5	4	6'-1"	25
Z7	6	5	4	5'-8"	35
Z8	4	5	4	5'-2"	22
Z9	6	4	4	4'-5"	18
Z10	6	4	4	3'-9"	15
Z11	6	4	4	3'-1"	12
TOTAL REINFORCING STEEL					1547 LB

CLASS A CONCRETE BREAKDOWN	
4 WINGS	22.6 CY
2 END CURTAIN WALLS	1.9 CY
TOTAL	24.5 CY

PROJECT NO. 17BP.7.R.93

ORANGE COUNTY

STATION: 13+49.50 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE 2:1

105° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			5

DRAWN BY:	T. BANKOVICH	DATE: 6-16
CHECKED BY:	B.S. COX	DATE: 6-16
DESIGN ENGINEER OF RECORD:	B.S. COX	DATE: 6-16

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NORTH CAROLINA PROFESSIONAL SEAL 14268 ENGINEER BETSY S. COX
10/10/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.11	- -	1.75	1.26	1	TOP SLAB - MID	3.47	1.11	1	TOP SLAB - RT END	7.47	
		HL-93 (OPERATING)	N/A		1.44	- -	1.35	1.63	1	TOP SLAB - MID	3.47	1.44	1	TOP SLAB - RT END	7.47	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.15	41.4	1.75	1.26	1	TOP SLAB - MID	3.47	1.15	1	TOP SLAB - RT END	7.47	
		HS-20 (OPERATING)	36.000		1.49	53.7	1.35	1.63	1	TOP SLAB - MID	3.47	1.49	1	TOP SLAB - RT END	7.47	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.29	30.9	1.40	2.29	1	TOP SLAB - MID	3.47	2.36	1	TOP SLAB - RT END	7.47	
		SNGARBS2	20.000		2.15	43.0	1.40	2.15	1	TOP SLAB - MID	3.47	2.21	1	TOP SLAB - RT END	7.47	
		SNAGRIS2	22.000		2.29	50.4	1.40	2.29	1	TOP SLAB - MID	3.47	2.36	1	TOP SLAB - RT END	7.47	
		SNCOTTS3	27.250		1.38	37.6	1.40	1.72	1	TOP SLAB - MID	3.47	1.38	1	TOP SLAB - RT END	7.47	
		SNAGGRS4	34.925		1.54	53.8	1.40	1.63	1	BOT SLAB - RT END	0.25	1.54	1	BOT SLAB - RT END	7.67	
		SNS5A	35.550		1.55	55.1	1.40	1.78	1	BOT SLAB - RT END	0.25	1.55	1	TOP SLAB - RT END	7.47	
		SNS6A	39.950		1.52	60.7	1.40	1.65	1	BOT SLAB - RT END	0.25	1.52	1	TOP SLAB - RT END	7.47	
		SNS7B	42.000		1.52	63.8	1.40	1.65	1	BOT SLAB - RT END	0.25	1.52	1	TOP SLAB - RT END	7.47	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.24	73.9	1.40	2.29	1	TOP SLAB - MID	3.47	2.24	1	TOP SLAB - RT END	7.47	
		TNT4A	33.075		1.62	53.6	1.40	1.96	1	BOT SLAB - RT END	0.25	1.62	1	TOP SLAB - RT END	7.47	
		TNT6A	41.600		1.55	64.5	1.40	1.81	1	BOT SLAB - RT END	0.25	1.55	1	TOP SLAB - RT END	7.47	
		TNT7A	42.000		1.57	65.9	1.40	1.77	1	BOT SLAB - RT END	0.25	1.57	1	TOP SLAB - RT END	7.47	
		TNT7B	42.000		1.53	64.3	1.40	1.82	1	BOT SLAB - RT END	0.25	1.53	1	TOP SLAB - RT END	7.47	
		TNAGRIT4	43.000		1.60	68.8	1.40	1.69	1	BOT SLAB - RT END	0.25	1.60	1	TOP SLAB - RT END	7.47	
		TNAGT5A	45.000		1.58	71.1	1.40	1.62	1	BOT SLAB - RT END	0.25	1.58	1	BOT SLAB - RT END	7.67	
		TNAGT5B	45.000	⟨3⟩	1.28	57.6	1.40	1.38	1	BOT SLAB - RT END	0.25	1.28	1	BOT SLAB - RT END	7.67	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

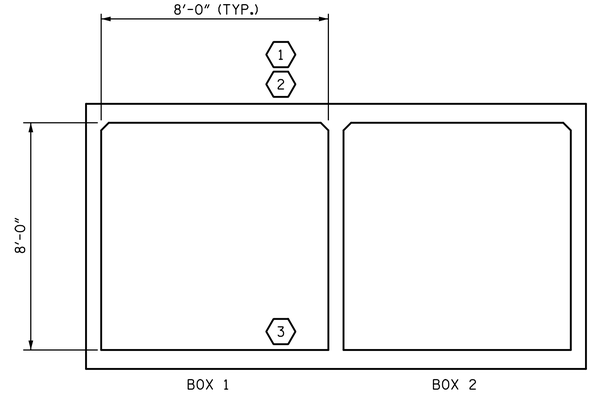
⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. 17BP.7.R.93

ORANGE COUNTY

STATION: 13+49.50 -L-

SHEET 5 OF 5

DRAWN BY: T. BANKOVICH DATE: 6-16

CHECKED BY: B.S. COX DATE: 6-16

DESIGN ENGINEER OF RECORD: B.S. COX DATE: 6-16

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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 41268 ENGINEER BETSY S. COX

10/10/2016

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			5

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF	
STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION	
GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT: ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

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